

Hi-Tech Moviemaking: 'Altered States' and 'Flash Gordon'
Timothy Leary: Scientists as Superstars

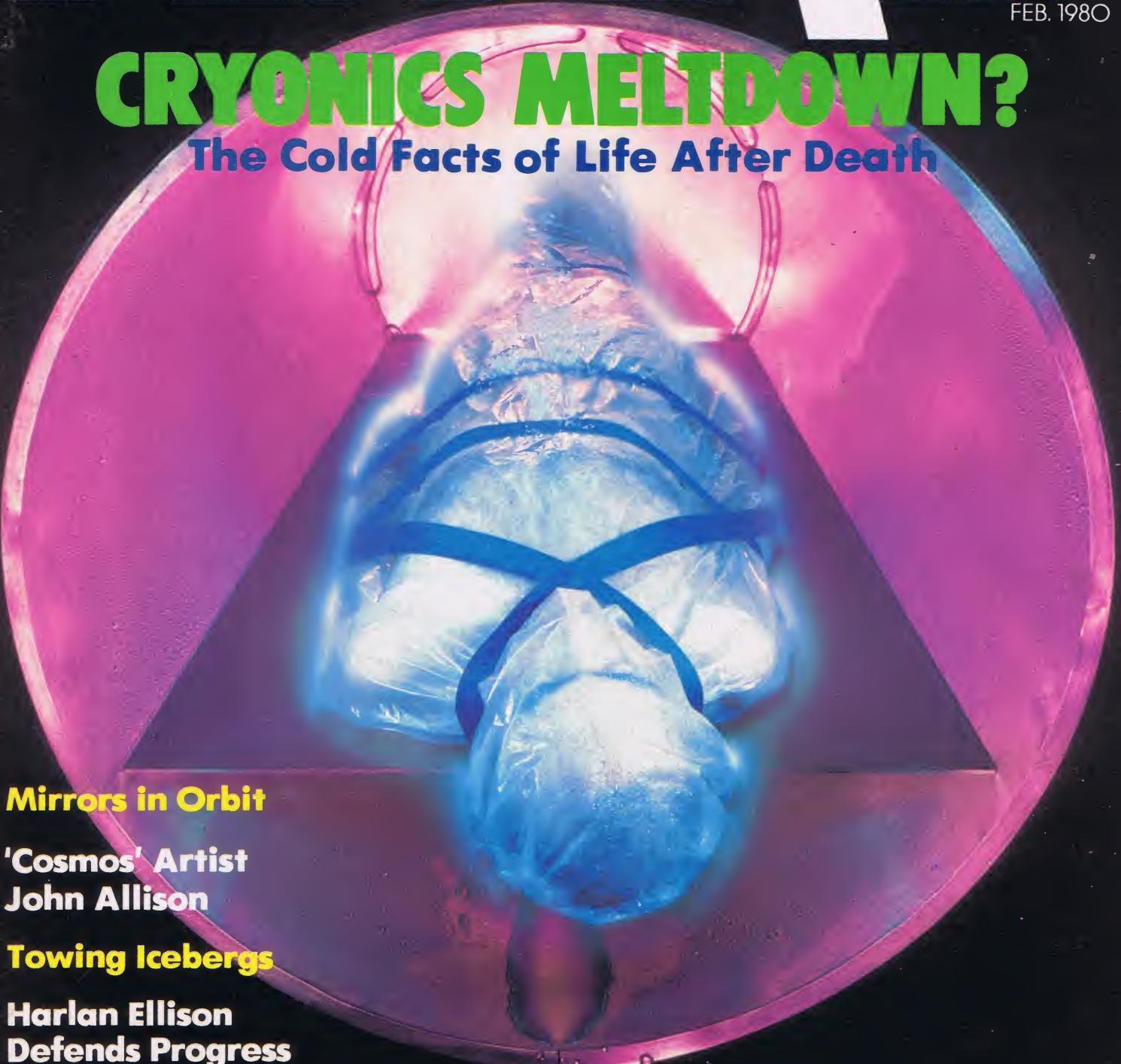
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CRYONICS MELTDOWN?

The Cold Facts of Life After Death



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John Allison

Towing Icebergs

Harlan Ellison
Defends Progress

Synfuels: Underground
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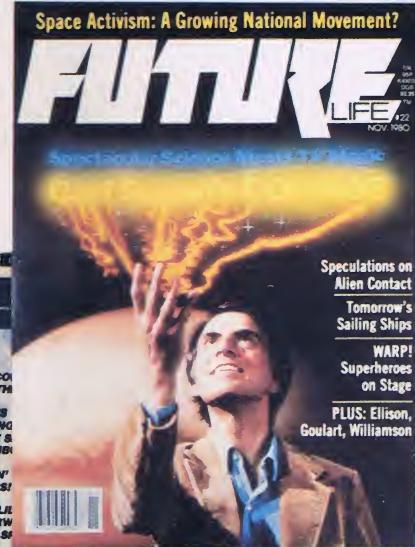
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#24 February 1981



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ON THE COVER: A human being in suspended animation, hoping to reawaken in some future time. Is he thawing out, or melting down? For the answer, see the article on cryonics on page 22. Cover Photography: © 1980 Michael Sullivan.

output

I never would have believed, some 15 years ago, when I was dreaming of the glory of idealistic future societies and space travel—and he was preaching the mind-expanding wonders of LSD—that one day Dr. Timothy Leary and I would perform a mind meld.

Leary is an exciting person. Whatever he's preaching, he captures attention. His ideas are worth considering, and he is always full of surprises. Read his *Tomorrow* column in this issue, and see for yourself.

Leary calls the readers of this magazine members of "that most powerful minority, The Smart Ones," and he pays tribute to the role of scientists in our culture. I cannot help but think back—way back—to FUTURE #2 and recall the major portion of an editorial I wrote:

It's easy to understand why front-page political double-talk doesn't lift my spirits. It's easy to understand why movies about losers and TV shows about "those ordinary folks next door" fail to excite me. It's easy to understand why all the cultural garbage we are bombarded with has profoundly *negative* effects on my emotional outlook toward life. But why does science almost always send me soaring?

First, it is a field in which man's rational faculty—his ability to see, understand, learn, create and triumph—comes shining through. It is a field which absolutely demands that man rise to the highest point of his intellectual arc—because there can be no cheating or double-talk with the hard laws of nature.

Second, the field of science is necessarily *purposeful*. Every test must have a goal and, theoretically, every goal must benefit human beings. There is no place for aimlessness.

Third, the field is populated by people who possess the kind of keen mind and zeal for the activity of living that *ought* to be in *every* profession. The losers and ordinary folks don't last long in the research and development labs.

Imagine yourself living in a world in which, suddenly, all the scientists boarded a fleet of spaceships and departed for outer space. Imagine the *feeling!* There would be no more innovations; no more discoveries; no more daring new experiments—just the same safe "tried-and-true" routines and products.

You might not miss the scientific community *directly* because you probably never actually see them working (they're generally rather socially invisible people), but you would miss the magazine articles telling you of their research and breakthroughs—letting you know that *somewhere* there are magnificent people busy creating the future.

I'm sure you'll agree that a world without scientists is a grim thought indeed.

We all know and appreciate the *practical* benefits that scientists bring into our lives: they make us healthier and extend our life expectancies; they create systems and machines that reduce our physical efforts and multiply our powers; they devise gadgets that entertain us, transport us, comfort us and protect us. We know that our lives are physically and emotionally improved because of the people of science, but it's time we paused to toast these special people for a role they play in our lives that usually goes unnoticed.

Here's to scientists as sources of excitement, happiness and inspiration—here's to scientists as heroes!

Kerry O'Quinn/Publisher

P.S. I want to encourage all you "Smart Ones" to make a point of finding and purchasing the next issue of FUTURE LIFE, our Third Anniversary Issue. Now that the magazine is *not* distributed to regular newsstands you'll either have to subscribe or find it at Waldenbooks or your local science fiction shop. The next issue will celebrate our *third year* as the premiere, original science fiction and fact futurist magazine. Don't miss it!

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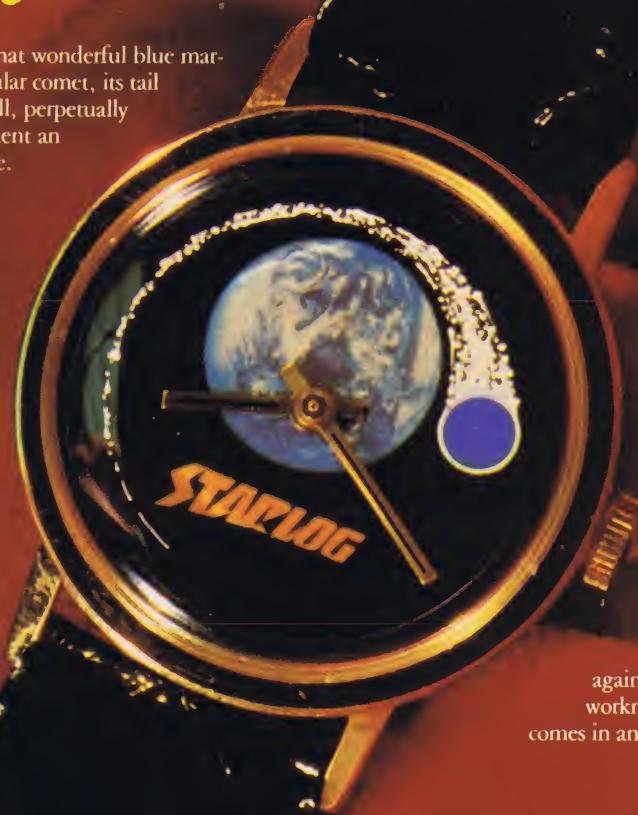
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SPACE ACTIVISTS

...In regards to your article "Space Activists, The Movement Gains Momentum," FUTURE LIFE #22, I wish to express on behalf of all of us who are active in support of our nation's space efforts, both public and private, our gratitude! This list will be a great help in the months ahead.

Now I would like to help promote these groups and our common goals, visions and dreams. These groups are at present ununited except in spirit. However, were we to hold a joint national convention with representatives from all the organizations, we could formulate a platform and draw up a step-by-step program of objectives and goals that would help everyone promote these dreams and goals in an organized and professional manner. I therefore urge the leaders of all these groups to work toward such a convention. Remember, there is strength in unity, also visibility, which we will need to show America the potential harvest that awaits us in our solar system home.

Rory Duke Groner
Dobson, NC

...Thanks ever so much for your American Space Interest Groups chart. I've been looking for just that type of list for quite some time now. It was interesting reading, and I have written for more information from several of the organizations listed therein.

I've been looking toward the stars for as long as I can remember, but it's only been recently that I've brought my thoughts out of the clouds and gotten down to some real action. In giving credit where it's due, I'd like to thank FUTURE LIFE for part of that change of attitude.

Tammy Gibbs
Durango, CO

...Congratulations on that wonderful article "Space Activists" by Trudy E. Bell. Thank you. How about more of the same, perhaps a calendar of events for these organizations? I am now a confirmed reader.

Ron Norvell
Alexandria, MO

DRAFT DODGE

...Three toots from my coke stash for Kerry O'Quinn on "Compulsory Freedom"

(FUTURE LIFE #22). Kerry is right about the idiocy of drafting people to defend themselves under penalty of law.

It's good to see a balanced debate on improving our laws and customs rather than another sterile discussion on the wonders of technology.

Baybee Nono
Belmore, NY

...I was thinking about your "Compulsory Freedom" editorial, and I disagree with the logic of it. It should not be a personal decision to go fight in a war because if it was, very few people would go.

Jerry De Luca
Montreal, Canada

...I am in the Army of the United States and very proud to serve as a career soldier. I speak up for the draft. The Soviet Union has these advantages over us: 1) you serve two years but you can be called back to duty until you are 65 years old; 2) they outnumber us six to one, etc. We need to wake up or this could be our last battleground. If you want to see the 21st century as a free nation, then let's get on the ball.

SP4 Paul E. Truitt Jr.
Ft. Devens, MA

Kerry O'Quinn replies: *When the 21st century arrives I profoundly hope that all the nations of our planet will be enjoying freedom. And I mean by that: worldwide free enterprise for businesses, freedom from government oppressions and regulations, and personal, individual freedom—including the right to make personal decisions about what you want to do with your life—especially when it comes to military service. For the moment, however, dictatorship countries provide a threat to freedom by their unending hunger for spreading their system and their conquests. But let's not confront that oppression from abroad with our own internal oppression in the form of forced servitude—even if the cause is good and valid. Draft enforcement makes us no better than our enemies.*

ON YOUR MIND

...Thank you for the fascinating article on human intelligence increase by Robert Anton Wilson (FUTURE LIFE #21). I think you should start a regular column on the related concepts of intelligence increase, consciousness expansion and increased awareness of reality. I agree with your other letter writers that drugs are not the answer to gain the necessary level of consciousness. But research should be done to find some kind of drug that could be used once to trigger the mind to its full potential. This is the hope of mankind.

Our greatest weapon is our minds. But we

have shackled our biggest advantage and turned ourselves into robots. If every person on this planet could see with a fully conscious and fully aware mind their place on this world and how we are interconnected with everything in the universe it would be the greatest breakthrough ever made by mankind.

We create reality with our minds. But we are not aware of this. If we were, we could change what we have botched up. We are gods who have forgotten the full extent of our powers.

Unfortunately, I do not have the answers on how to achieve our potential. But I believe this is the most important problem to be solved. To solve the mysteries of the human mind and to use it as it was meant to be used is where our research money should go. Readers of FUTURE LIFE should be in the forefront, and a good place to start is by reading books on metaphysics and cosmology. There are dozens of books, but two I recommend are by Colin Wilson: *The Occult and Mysteries*.

Bruce M. Chappell
Enfield, CT

SONAR SOLUTION



...I eagerly read your article in FUTURE LIFE #20 on Dr. John Lilly's Project Janus. I am convinced, like Dr. Lilly, that dolphins and whales are highly intelligent creatures with language comparable to our own. But does it work like man's: sounds that represent things, experiences, thoughts? Perhaps it does not.

I suggest another hypothesis: that dolphins and whales do not communicate with words, but with visual motion-picture images transmitted by sound or "sonar holograms." Rather than listen for words, we should look for pictures. The dolphin does not transmit a set of sounds with agreed-on meanings to represent an experience or thought, but rather it transmits a set of "sonograms," a sound encoded with a picture of the experience itself, or even of a thought. The brain of his fellow dolphin translates the sound into a visual image in the same way it translates a

sonar echo into a picture.

I suggest that this same technique can be used to translate dolphin and whale language into visual images. The dolphin will provide the sonar beam that carries the picture, man can mix it artificially with a beam of the same frequency that has no picture on it, and turn the resultant interference pattern into a hologram. Their language may also be partly pictographic, like hieroglyphics, but the basic form of communication is the same. All work since the Navy experiments indicate that this hypothesis is probable (for example, dolphins are proven to transmit sonar echoes to each other) and I hope it can be tested before it is too late to save the dolphin and the whale from extinction by man.

Neil Hudner
Berkeley, CA

ARTISTIC DIFFERENCES

...I agree with Mr. Mendola when he states that credit should be given where credit is due (FUTURE LIFE #23). He should therefore agree with me when I say that criticism should be directed when criticism is properly due.

I did not mean to imply that the technique I use is in any way unique. However, the implication is not entirely mine and should be shared with the interviewer. The airbrush technique that I use is certainly not any secret to be revealed, and airbrushes are indeed not new (Cro-Magnon man sprayed pigment onto cave walls many thousands of years ago, using nothing more than a hollow tube and his own lungs as the air source). While being interviewed I discussed airbrush technique at length, especially the method that I use. Like most other artists, I independently developed a technique which I adopt as my own. It's the method I use, and it's part of my artistic "style," no more or less important than anyone else's. The quote in the article, "It took a lot of trial and error, but it's my technique," is easily misinterpreted. Perhaps I should have said "...but it's the technique that I use," instead.

Had the entire content of the interview been included in the article there would have been fewer inaccuracies and chances for misinterpretation. Though I understand the inevitable flaws in any interview, I seem to be cultivating a moderate dislike of interviews in general, and a mild distrust of promotional magazines such as this one in particular.

Adolf Schaller
Santa Monica, CA

Mr. Schaller is correct in saying that, because of the large amount of information in any interview, certain inaccuracies are almost inevitable. However, we certainly regret any serious misunderstandings that may have arisen from the interview, and we sincerely apologize to both Mr. Schaller and our readers for that.

SPACED OUT

...Re: D. Booker's letter on "Manifest Destinies" in FUTURE LIFE #22. Please read *A Step Farther Out* by Jerry Pournelle. You'll change your tune about why the U.S. and the rest of the "Free World Nations" should and must (and can, since we still have the technology and resources) venture into space now—not only for profit and the betterment of life in the Third World nations, but for the survival of the human race. Let's be remembered as "the generation that gave mankind the planets and the stars—not extinction."

Also: To William R. Carter Jr. on NASA's "best enemy." Robert A. Heinlein and I agree with you completely! Senator Proxmire is a real pain in the space program's propulsion system. The sooner he's out of office the sooner we can live a better life on Earth through life in space. Voters of Wisconsin, give space a chance, vote Proxmire out!

Laura Pickette
Seattle, WA

GROWING DOWN

...Filled as they are with fundamental ignorance and superstition concerning science and technology, John Holt's tiresome attacks on the scarcely newborn ideas of space settlements are curiously at odds with his championing of creativity and education for young minds (Alternate Space, FUTURE LIFE #21). How can he pretend to understand the dynamics of innovation and imagination, and still persist in trying to strangle one of its newborn in the cradle? Perhaps his studies in child education are merely a veiled attempt by the adult world, so-called (degenerated children all), to co-opt and control childhood's rampant growths, all in the guise of sympathetic theorizing. Yes, I feel bitter about Holt, who was once a hero, and now denies his children because he can no longer recognize them. It's an old story. Einstein denied quantum mechanics as an old man. Holt is paralyzed with the specter of mistakes and fallibility, forgetting that no enterprise can be free of them, and that before something can succeed it must begin as best it can. He now belongs to those who will try to kill an idea before it has a chance. I say shame to this man, this betrayer of himself. I cringe at the fact that my name appears on the same page as does his.

George Zebrowski
Johnson City, NY

INTERNATIONAL SPACE

...Regarding the letter from Timmophy Blaes, North Carolina, in FUTURE LIFE #20:

Preaching a solo effort by America to build space settlements and mine the Moon and asteroids is much more "idealistic foolishness" than a combined effort by all the leading nations of the world, including the U.S.S.R.

and other non-Western countries.

The world is fast becoming overpopulated. Even in Australia, with only 15 million, most of the population lives in the congested suburbs of the cities on the east coast and the fertile land inland is being rapidly developed. We can employ technology on the desert, but Mother Nature has the better hand. Space is the next frontier, and to face it properly, the great democracies like Australia and America must forget politics and add our leading technology of the West to the U.S.S.R. and her leading technology of the East.

Space belongs to all of us and the United Nations will make sure that no nation, such as the U.S.S.R., is able to gain unfair power or the Moon or anywhere else.

David Morris
Sandy Bay, Tas., Australia

SUSPENDING DEATH

...Perhaps I missed the article, or is it rare to see the present state of cryogenics as pertains to suspended animation of human types in your worthy magazine? Death has generally little appeal for us mortals I think it is fair to assume—how about news on rejuvenating chemicals on the genetic level for adults now

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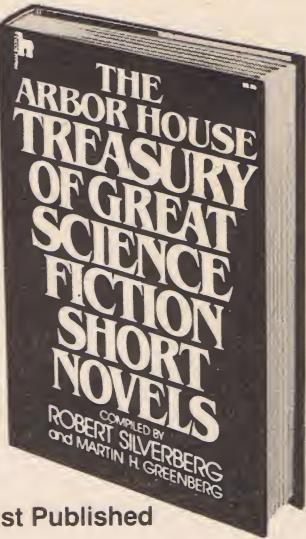
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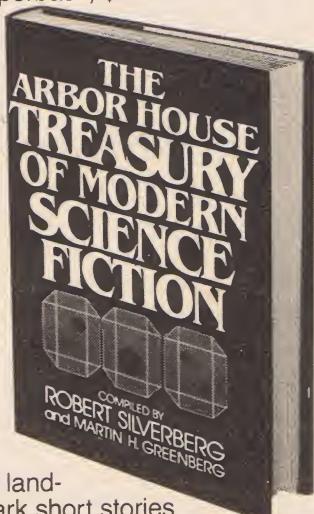
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ARBOR HOUSE

input

living? Elixirs of immortality? Increased sexual potency? Ha! Nice thoughts.

Give me a healthy mind and 10 billion years to grow old—let me fly though a spinning black hole to a newborn universe for a delicious drink of immortality—with a twist of lemon?

Nasty, that death thing. Ouch!

I'm interested in going on past normal limits. It's basic to thoughts of the future—making sure we'll all be there.

John P. Dulaney
Terni, Italy

For one alternative to that meeting with the Grim Reaper, see our article on cryonics on page 22.

UNBOXING ELLISON

...Hmmm. Interesting letter from Mr. Philip D. Lambert, Jr. in FUTURE LIFE #23, "He's [Harlan Ellison] a fiction writer, but FUTURE LIFE is not a fiction magazine." Wrong. You can't place Harlan Ellison in a box, even one that says "fiction writer." If any labels must be placed on the man, it's "writer," period. Mr. Lambert may not be aware that Mr. Ellison had been writing non-fiction, critical articles long before FUTURE LIFE ever existed. Mr. Ellison has written reviews on subjects ranging from movies to magazines; from comic books to concerts. I think Harlan Ellison belongs in FUTURE LIFE. Nowadays, he's about the only reason I snatch the magazine off the rack as fast as I can. (By the way, I hope that comic shops count as science fiction specialty shops since that's where I buy FUTURE LIFE. I've gotten hesitant about subscriptions; seems everyplace else in creation gets 'em before you do when you subscribe.)

Barb Schroeder
Nashville, TN

GRASS IS GREENER

...I'd like to correct an error in the Spinrad interview (FUTURE LIFE #23). He comments that "grass is legal in 15 states now." I'm afraid that, in spite of his fine writing, he's fallen into a common misconception. Though penalties have been greatly reduced, in varying degrees, across the country, marijuana is *not* "legal" anywhere in the United States.

A number of states, such as Virginia, have reduced the penalty for a first offense of simple possession to no more than 30 days in jail and a fine of a few hundred dollars, while retaining penalties of up to a year for repeated offenses. Others have reduced the penalty for first offense possession, or for possession of small quantities, to only a fine; in these cases, though a jail sentence cannot be imposed, possession is still a criminal offense. Some states have true "decriminalization," where

only a civil fine may be imposed for simple possession, with no criminal record resulting.

In all states, selling and growing marijuana are serious criminal offenses, drawing prison terms. In addition, not only these offenses but simple possession is a criminal offense under Federal law, regardless of state statutes. Readers who are concerned about this misuse of government power (and of our tax monies) should contact the National Organization for Reform of Marijuana Laws (NORML), at 530 8th Street SE, Washington DC 20003.

Outside of that error, I thoroughly enjoyed the interview. It also dovetailed nicely with Dr. Duncan's excellent letter in Input.

Let me close by thanking you for running Ellison's column, and for doing so properly (without censorship). He certainly doesn't need me to defend him (particularly against the likes of Lambert and Sapitano—Ellison "dull"? Knowing "nothing about anything connected with the future"? Come on, fellows!), but I'd like to balance their gripes by saying that his column is *the* reason I've bought the last several issues.

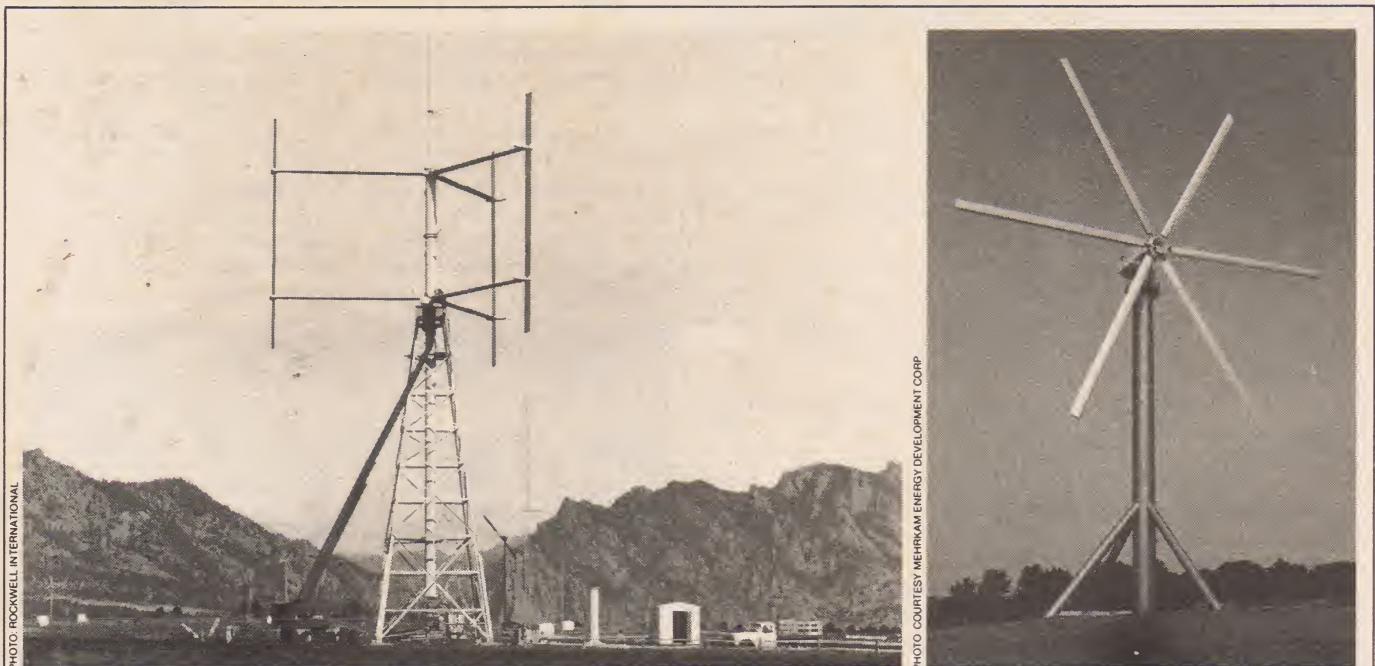
Roy B. Scherer
Executive Director
Virginians for Study of Marijuana Laws
Richmond, VA

CORRECTION

In FUTURE LIFE #22, in the article entitled "Psychogenetics," we inadvertently printed the wrong address for Dr. Win Wenger's Psychogenetics Workshop. The address is as follows: Psychogenetics, PO Box 332, Gaithersburg, MD 20760.

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Left: The Giromill turns wind into energy at DOE's Rocky Flats site. Right: The world's largest privately owned windmill.

WIND MACHINES

RADICAL ROTORS

The Dutch had a good idea when they erected those picturesque windmills centuries ago, and their energy potential is once again alive and well in the world's search for new power sources. But today's windmills, though working on the same principles, bear little resemblance to their ancient predecessors.

Take, for instance, the two-megawatt wind turbine operating at Metals Engineering Company near the small farming community of Hamburg, Penn. Said to

be the largest privately owned windmill in the world, the 180-foot structure looks more like a giant pinwheel. Supported by a bright blue base, the turbine consists of six long silver blades, each three feet wide, which turn at the relatively low speed of 36 revolutions per minute. This slow speed reflects the belief of the designers, Mehrkam Energy Development Company in Hamburg, that a windmill can generate enough power even in an area not known for high wind velocity. Winds in the Hamburg region average just over 10 mph, considerably below the 25 mph normally prescribed for wind generators. But Robert E. Truitt, presi-

dent of Metals Engineering, is confident that the design is a sound one. "We're trying to prove the validity of low-wind velocity areas," Truitt explains. "If this thing performs properly, at the end of seven years we are going to be operating without any energy costs at all." Echoing Truitt's enthusiasm is the designer, Terry M. Mehrkam, who says, "If we prove this works, this opens up a whole new area."

Much of the research in wind turbines is being conducted by the federal government, which operates several prototypes at the Department of Energy's Rocky Flats, Colorado site. One of their

most radical designs is the Giromill, a 126-foot oddity sponsored by McDonnell-Douglas Corp. In 1978 the company was awarded \$1.7 million to design, build and test the vertical-axis wind machine. The Giromill consists of three vertically mounted 42-foot blades and an electric generator or gearbox. The concept is that the angle of the blades will allow for winds from any direction to power the turbine at speeds as low as 10 mph. The Giromill generates enough electricity to power 15 conventional homes, and can run deep-well irrigation pumps for hundreds of acres of farmland.

—Bob Woods

SF ROCK 'N' ROLL

ARMAGEDDON AU GO GO

Billy Thorpe has seen the future of rock and roll—and it goes boom. That, essentially, is the climactic theory put across on Britisher Thorpe's new LP, *21st Century Man*. Thorpe, a singer/writer/guitarist, has fashioned a science fiction concept LP featuring a horde of individual songs which, taken together, form a scenario concerning humanity's future (or lack of it) on Planet Earth.

The idea came to him, he says, when he was living in Australia. "I had been a science fiction buff for years and recorded some sci-fi-based material as early as 1970," says the present-day Los

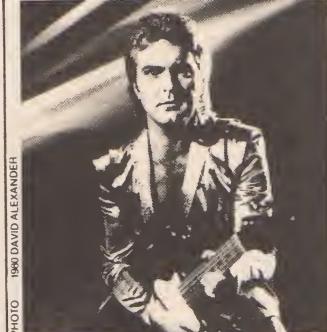


PHOTO: JOHN DAVID ALEXANDER
Boom goes rock 'n' roll.

Angeles resident.

A 1979 LP, *Children of the Sun*, the story of an advanced race of aliens who rescue the survivors of a war-ravaged Earth, set the stage for the new LP. *21st Century Man* begins in 1991, a year which marks the beginning of the end for the human race.

"Although the album is a fantasy," Thorpe explains, "it is inspired by a combination of current events such as the Afghanistan and Iranian crises and their possible consequences, the rapid approach of the year 2000 and a Nostradamus prediction of a devastating war in the 1990s."

"So I chose the year 1991 and a world war that ends in a nuclear holocaust to begin the album. The blast has destroyed half the Earth and its population, and set the planet in an orbit closer to the sun. For the first time in its history, the world is united to save itself. But it's far too late. It's at this point that the Sun Children, who have watched mankind for millions of years, offer everyone the opportunity to leave."

The intergalactic shuttle ser-

vice is explained through such songs as "Solar Dawn," "We Were Watching You" and "21st Century Man."

The second side of the LP centers on one Earth survivor and shows his rise to power in the brave new world chosen by the Sun People as new Earth. "After going through the experiences on side one," says Thorpe, "the *21st Century Man* now starts to emerge as a force in the story."

Should any music lover think that the LP is too spacey for their tastes, the album ends with the Earthbound song "In My Room," a story about a kid sitting in his room, high, listening to his headset. "He dreams of the day when he will own his own car and of being a rock star who is the hero of millions."

—Joseph Kay

TOMORROW'S ARMY

A MILITARY FUTURE

How seriously interested in space is the U.S. Air Force? According to Capt. Stanley Rosen, USAF, "It would appear that military man's time in space will come before the 20th century closes." One of the possibilities he is referring to is Air Force interest in the feasibility of replacing today's flying command posts with one or more permanently manned space stations. These stations, which could be maneuvered along a geostationary orbit around Earth's equator to observe any "trouble spots," would act as nerve centers for communications traffic from the ground and from other military satellites.

This and other long-range Air Force plans were announced this summer at the First Global Conference on the Future. The Air Force's plans in space fall into two general categories: the use of space facilities to support military activities here on Earth (which is all that's been done so far), and the defense, in space, of American space assets.

Besides the space command-and-control center, other space facilities the Air Force would like to build to aid military operations on Earth include:

- Satellites with antennae over 200 feet across, which could

provide individual voice communications for 100,000 simultaneous users (troops), or which could control, and receive TV pictures from 3000 remotely piloted vehicles (drone airplanes) in a war zone 1000 miles across.

- By the year 2000, or earlier if NASA helps out, a "Dick Tracy" type of wrist radio system—using a space antenna 1000 feet across—with potential for both civilian and military users.
- Giant early-warning arrays and observation telescopes that will help assure compliance with arms-control agreements.

The idea of "space defense" is relatively new; it has evolved partly because of the increasing reliance that military and civilian users alike are placing on our space facilities, and partly because of the Soviet development of "killer satellites."

For these reasons the Air Force plans to develop "harder" satellites, which can withstand attacks by exploding killer satellites or by high-powered lasers or particle beams. Plans for satellites that can "run away" from potential attackers are also in the works. And the Air Defense Command recently installed the first phase of a sophisticated "satellite attack warning system" in their Cheyenne Mountain complex.

The Air Force has not been

given permission to deploy any form of anti-satellite (ASAT) system (like the Soviet killer satellites), but they are developing several designs just in case. Capt. Rosen pointed out that *none* of the ASAT options uses nuclear weapons.

All of this may get much more

complicated if the U.S. starts to make major investments in solar power satellites, manufacturing, or mining in space. And the public will have to decide on the benefits and costs, or even dangers, of increasing militarization of space.

—Randolph J. Steer



Future defense: Star Wars fantasy or intergalactic arms treaties?

ASTRONOMY

A STAR IS BORN

For the first time, astronomers will be able to watch a star evolve within their lifetime because of an unusual discovery made by two Arizona researchers: Dr. John McGraw, of the University of Arizona Steward Observatory, and Dr. Sumner Starrfield, of Arizona State University's department of physics.

They have found an exceedingly hot pulsating star that is exhausting its fuel supply very rapidly. Because of this, the star is "aging" quickly and the scientists expect to see physical changes within a few years that normally would take millions or even billions of years.

With a designated name that looks more like the post office's new zip code proposal, the pulsation or variability of this star (called PG 1159-035) is the first new stellar discovery made with the Multiple Mirror Telescope on

Mount Hopkins in southern Arizona (see FUTURE LIFE #14, page 16).

The new variable star fluctuates in size and brightness every eight minutes, and it is these pulsations that will give astronomers details about its interior.

The surface temperature of this star is certainly nothing to sneeze at—126,000 degrees F (compared with 11,000 degrees F for the sun). At such extremes, astronomers figure the star should be evolving very rapidly. And it's the pulsations that will give them a way to chart those evolutionary changes for the first time.

Bringing this discovery a little closer to terra firma, astronomer McGraw notes that, "This information is directly applicable to our own sun and its evolution. Ultimately, this could lead to better understanding of how the sun may influence Earth's long-term climate."

—Philip L. Harrison



SKEPTICAL

Scientists endeavoring to explore
What did in the dinosaur
Through proposals convoluted show
Events transpired eons ago.

Theories; there are no dearth
Asteroids that crashed to earth
Radiation; exploding stars
Everything but men from Mars.

While such hypotheses impress
I'd also like to make a guess
In Cretaceous times the earth was flat
The fools fell off; and that was that.

—Bernard Bicksilver

LITERATE CINEMA

SF FILMS DUE

Authors Isaac Asimov, Alfred Bester and John Sayles may have their literary work translated to the widescreen by 1982 for audiences worldwide to appreciate. Asimov leads the pack with two works in progress. At Warner Brothers, the signal is still green for an adaptation of his famous *I, Robot* novel. The film will be helmed, at this point, by *Empire Strikes Back* director Irv Kirshner. Meanwhile, over at New World Pictures, Roger Corman is developing Asimov's "Nightfall" as a proposed \$5-7 million SF drama. To be produced by Julie Corman, the film, according to the New World head, "is an admittedly difficult story to adapt to the screen. It's short

and to the point. 'Nightfall' is a really ambitious project from a dramatic viewpoint. Julie wants to do the Asimov story justice."

After a long hiatus, Alfred Bester's *The Demolished Man* seems to be inching its way toward production as well. The telepathic SF classic of the early 1950s was originally to have been filmed by Brian De Palma whose interest in the book dates back nearly 15 years. After the release of De Palma's *The Fury*, talk was rife that Bester's work would be the young director's next project. It never materialized and, apparently, the director has since lost interest. *The Demolished Man* is currently being revitalized by producer Edward (Conan, The Phantom of the Paradise) Pressman.

John Sayles, the prolific talent

responsible for such novels as *Union Dues* and *Pride of the Bimbos* and such screenplays as *Piranha*, *Battle Beyond the Stars* and the upcoming *The Howling*, has completed his screenplay for Steven Spielberg's still top-secret flying saucer/extraterrestrial film. Despite his contractual obligations as art director for *Conan*, it still looks as if Ron Cobb will be making his directorial debut on this spacey sage.

"Right now the project is still on," says Sayles. "I believe Rick Baker is going to make the little creatures. Ron Cobb is still scheduled to direct despite *Conan*. The movie doesn't have a start date as yet but Steven is really hot for Ron to do it. Ron, however, is committed to *Conan* and *Conan* is taking forever. It's a good script for Ron to start with



Asimov goes to the movies.

in that he's never worked with actors before. This script is close to being actor-proof. It needs a very natural, low-keyed kind of acting to pull it off. It needs a director with a good visual eye. Ron certainly fits the bill."

—Charles Bogle

FUTURE FARMING

BIONIC RICE

Every year, the rice paddies of the world are plagued by a devastating fungus known as rice blast. To combat the pesty growth, an epidemiologist at Pennsylvania State University, with the aide of a computer manufacturer in Logan, Utah, has developed a monitoring system that will greatly reduce, and possibly halt, the fungus.

Dr. David MacKenzie began investigating the spread of agricultural epidemics about five years ago. What Dr. MacKenzie and Howard Schimmelpfennig of Omnidata International have done is to place microcomputers directly into the rice fields. The device, small enough to fit in the palm of your hand, is programmed to duplicate the natural monitoring systems of the rice plant itself. It evaluates such factors as temperature and humidity to determine how they affect the spread of the crippling rice blast.

There are presently three test programs underway, one in Colombia and two others in the rice fields of the Philippines. Pro-

totypes of the minicomputer are being used.

"As far as we can tell," reports Dr. MacKenzie, "from the preliminary information, they're working pretty well." Dr. MacKenzie says that the prototypes will be evaluated in January or February to determine whether any modifications in the programming are needed. "If it works out well, and if the company is interested in manufacturing them, we would let them go ahead. They will run in the neighborhood of \$500 to \$800," says Dr. MacKenzie, "if produced on a relatively mass scale—several hundred units."

The cost factor is only one of those included in Dr. MacKenzie's concern for how this, and other types of agricultural technology, are presented to the farmer. The researcher asserts that aside from developing programs that technically assist the growers, they must also be designed for their acceptability.

Dr. MacKenzie advocates the use of what he calls rural psychology in dealing with farmers as individuals taking calculated financial risks. "We have to keep the



costs down and not make it so complicated," Dr. MacKenzie believes. "We need to know what kinds of systems we can develop that the farmers will like."

He refers to the relative simplicity of the rice blast analyser. "It runs off pen-light batteries for an entire year. You can put it literally anywhere and it will work. When it starts to run out of power, it gives you a three-month warning. I figure anywhere in the world you can get batteries in three months."

Rice growers now deal with rice blast by regular spraying of fungicides, a program Dr. MacKenzie thinks needs careful reconsideration. "We're trying to come up with some way that we can cut down on the dependence

on fungicides and eliminate the need to apply them according to the calendar. The device tells them when the next spraying is necessary."

This whole program is being complimented by a genetic breeding study, also being conducted at Penn State. "We will be breeding for a new type of resistance to blast that will slow down the rate at which the epidemic increases. If we can compliment that information with the intelligent use of fungicides, we'll have come a long way in controlling blast."

If the prototypes are deemed successful, they will be applied to rice paddies in Brazil and Korea, where the blast fungus is annually obliterating much of the crop.

JUPITER PHOTOS

VOYAGER AS ARTIST

When our two unmanned spacecraft, Voyagers 1 and 2, flew by Jupiter and its moons, they transmitted back to a waiting Earth hundreds of detailed photographs. Those pictures were rich in scientific data, supplying NASA with a great deal of important information concerning the makeup and behavior of our planetary neighbors. However, they also have a more artistic value that can be appreciated even by those of us who never made it past elementary algebra: the beauty of Jupiter and its satellite Io, the strangeness of its ring, and other marvels.

An exhibition of 75 of these photos, in both color and black and white, is now on view at the Smithsonian's National Air and Space Museum in Washington, D.C. The show, entitled "Jupiter and Its Moons," is being displayed in the museum's Space Hall, and will run until February 20. Admission is free.

—Barbara Krasnoff

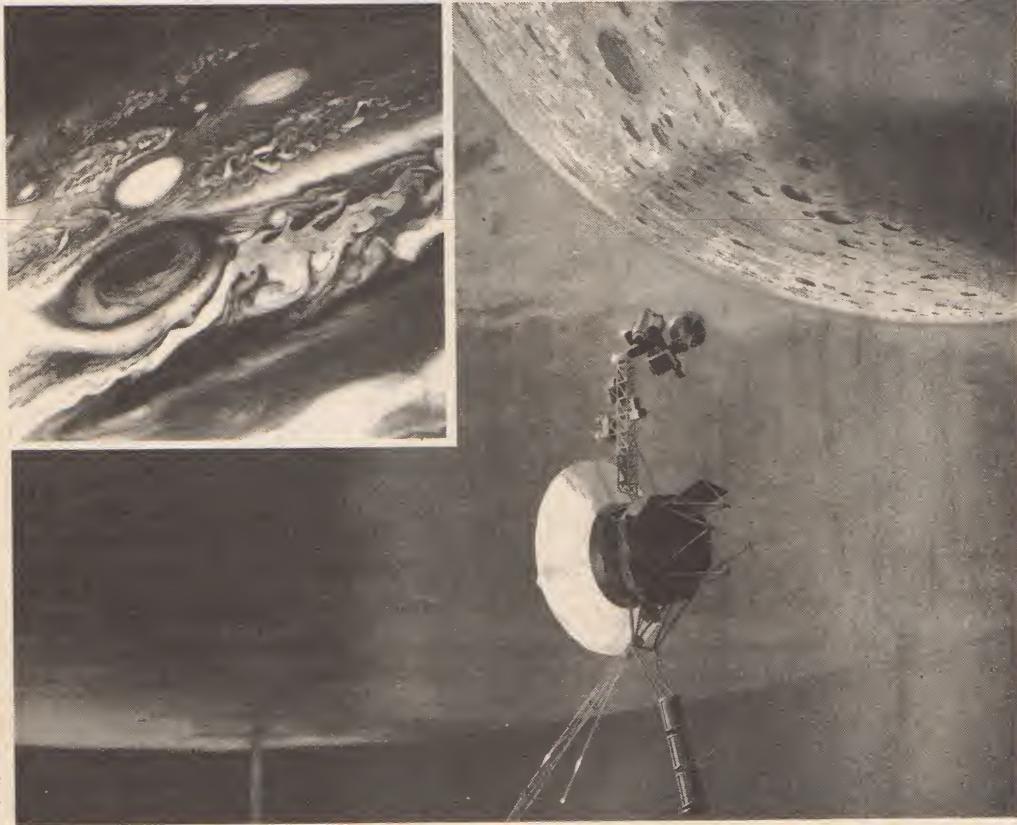


PHOTO NASA

CONDORMAN COMETH

SHECKLEY'S SHUPERHERO

Condorman is coming. A \$14 million superhero spoof, *Condorman* is due to hit theaters this June featuring special effects by Colin (*Superman*) Chilvers and a storyline based (well, sort of) on Robert Sheckley's *The Game of X*. In Sheckley's book, published in the mid-1960s, cartoonist Willy Wilkins is asked by the CIA to assume the guise of one of his famous superhero creations. In order to perpetrate the hoax, the CIA must furnish Willy with all the gizmos necessary for transforming cartoon to reality.

The aforementioned synopsis may or may not be what the finished film is about.

"I don't know too much about it," says author Sheckley in New York while the production is being filmed on location in Europe. "The Disney studios bought the rights to *The Game of X* about two years ago. They did specify that their screenplay wouldn't really be based on my book. They just wanted to use some of my plot devices. I guess you could say it's loosely based on my book."

Was Sheckley asked to participate in the writing of the screenplay? "No. They somehow didn't think about that," he says. "Hard to believe, isn't it though? You just know that they've been

looking for a chance to get me out to Hollywood. They blew it again. I don't know why people don't even call me when they do movies based on my books. I have less involvement with these films than a sample audience in Glendale."

The finished film, which may or may not be previewed in Glendale, will star Michael Crawford as Condorman, as well as Oliver Reed, Barbara Carrera and James Hampton in supporting roles. The finished screenplay is by Glenn Caron, Marc Sturdivant and Mickey Rose. *Condorman* is being directed by Charles Jarrott and produced by Jan Williams.

—Ed Naha

BAD BAD BART

MAGNETIC SMOG

In the beginning there was automobile smog. Then there was acid smog. Now, residents in San Francisco, Washington and Atlanta may be feeling the effects of magnetic smog... or not feeling them, as the case may be.

Antony Fraser-Smith, a senior research associate at Stanford University, has discovered a residual magnetism associated with San Francisco's Bay Area Rapid Transit (BART) system. Calling it "magnetic smog," Fraser-Smith came across the phenomenon as he was experimenting with ultralow frequency magnetic radiation from outer space. An inexplicable fluctuation in his instruments... and a hunch... led him to a BART line where, as he puts it, his instruments went "ding, ding, ding."

There is no question in his mind that the third rail of the BART tracks, which provides 1,000 volts of direct current, is the source of the magnetic transmissions. But he is not sure of the biological impact this may have on human beings, outside of indications that it may make them sleepy.

"We aren't talking about causing any disease with magnetic radiation," he said. "What we are talking about here would be behavioral changes. But nothing has been established by scientific study as yet."

But he believes that such a study should be made, since there is some evidence of a parallel between magnetic radiation and the waves given off by the human brain in sleep.

His conclusions about BART would apply to any rapid transit system using the same voltage, such as Washington's METRO and the Atlanta subway system.

Fraser-Smith is not suggesting that there is cause for alarm, though. But he does assert that it is "certainly unnatural for people to be exposed to magnetic fields at such levels."

A study has been proposed that would include biologists to look into the consequences of such exposure. Experiments with migratory birds, for example, has found some of them to be guided by magnetic fields.

—Philip L. Harrison

VIKING

A detailed black and white illustration of a Viking lander on the surface of Mars. The lander is a complex mechanical device with various instruments, solar panels, and a mast. It is positioned on a rocky, reddish-brown terrain. The background shows a vast, desolate landscape under a clear sky.

WANTS YOU

NOW is the time to show strong support for space activities! The Viking Fund wants each of you to contribute a minimum of one dollar to the Viking Fund to assure the continued study of Mars for the next decade. Such a dramatic show of interest in space exploration would focus attention on other underfunded space projects. If the Fund is successful, one million dollars over the next ten years would be made available to NASA, to the Jet Propulsion Laboratory (Viking Mission Control), and to private Viking researchers to extend the analysis of the Viking data from Mars. And this is just the beginning. Thousands of space believers have responded to Viking's call, but many more must make their voices heard if space activities are to reach a high national priority. All contributors will receive regular updates of the progress of the Fund and of Viking, as well as an invitation to the dedication of the Fund to be held in Washington, D.C. this year. Perhaps you have spent your dollars to see the exciting fantasies of Star Wars and Star Trek; now you can spend your dollars for the exciting realities of exploring Mars. It may just be the best investment you'll ever make.

The Viking Fund, P.O. Box 7655, Menlo Park, California 94025

FLASH GORDON FINDS HIS ROOTS

In an effort to escape the sophisticated '80s, a comic book legend recaptures the look of the '30s.

By ED NAHA

It is becoming increasingly difficult to mount a science fiction film that can be called *non-derivative*. Critics and fans alike are quick to find fault with a film that picks up a look or a plot twist from a previous genre production. When *Silent Running* first appeared a decade or so ago, some of its detractors cried "2001!" *Battlestar Galactica* sputtered bow-first into a wall of "Star Wars" choruses and even *ALIEN* found itself hounded by the almost existential whisper of "*It! The Terror From Beyond Space*." In such a critic-laden time period, what's a moviemaker to do if he wants to dabble in SF? If you're Dino De Laurentiis, the acknowledged master of total unpredictability, you buck the trend and produce a movie that is *totally derivative*... *Flash Gordon*.

"It's basically the comic strip come alive," says director Mike Hodges, resting in a New York hotel shortly before the film's American premiere. "The look, the feel of it is very much out of the 1930s. It's a physical representation of Alex Raymond's original artwork. It's definitely not your 2001 type of film."

Whether or not Hodges' enthusiasm for the film will be transferred to the movie's audiences remains to be seen. At this stage of the game, however, one thing is clear. This first cinematic appearance by SF pulp mainstay Flash Gordon in nearly 40 years is a better film than anyone really expected it to be... including Hodges himself. "Initially," he recalls, "I was terrified of doing this

for a number of reasons. It's a massive project filled with special effects. None of my previous films [*The Terminal Man*, *Omen II*] used any optical effects at all. I turned the movie down, at first. But Dino can be very persuasive when he wants something done. I eventually accepted his offer graciously, forgetting all the problems connected with the movie up until that point."

Prior to Hodges' appearance on the scene, the big-budgeted *Flash Gordon* project seemed to be earmarked as an epic dud. De Laurentiis had tapped director Nicholas Roeg, famous for the brooding sensuality of such films as *Don't Look Now* and *The Man Who Fell to Earth*, to helm the film. Eventually, after Roeg and De Laurentiis clashed on a number of occasions, it became clear that De Laurentiis' idea of the modernization of Flash Gordon and Roeg's were not compatible. Roeg left to direct a smaller picture (*Bad Timing/A Sensual Obsession*, starring Art Garfunkel) and De Laurentiis turned to Hodges and Federico Fellini's production designer Danilo Donati for a new approach. The new approach actually turned out to be the old approach as the two men reverted back to Alex Raymond's original literary concepts for inspiration.

Screenwriter Lorenzo Semple Jr. handed in a finished draft that emulated the original story as much as possible, and a decision was made to leave science fact behind and, instead, totally concentrate on Raymond's formula of science fiction/fantasy swashbuckling.





PHOTOS BOB PENN © 1980 FAMOUS FILMS BY

"All that sounds quite easy," says Hodges. "Just take a comic strip and make it breathe. In reality, it was a monumental assignment. We looked at the comic strips and there they were, splendidly lying on a flat page; all these wonderful settings and action scenes. You'd think to yourself: 'Well, now we just have to make them come alive.' Then you'd start taking these one-dimensional things and transferring them to living three-dimensionality. Soon you were thinking: 'I will never get them to come alive!' Once you got that out of your system, you had to find ways to translate everything to film."

"Once we found that we could take a single scene and make it move and talk,

the work became easier. Getting to that point, however, was murder. The amount of special effects in this film is staggering. The things you accept as happening in one single comic book frame often takes months of special effects work to translate to film."

Handling the special effects for *Flash Gordon* was veteran optical ace Frank Van Der Veer. Sequestered in his West Coast film lab, he recalls his experience on the project with an exasperated laugh. "I've never worked on a movie like this before. Never!"

"Basically, we didn't intend this to be a science fiction film. Today, people try to work as much science fact as they can into their movies so that some smug

Flying Hawkmen fill the sky in this SFX scene from *Flash Gordon*. The film's physical effects, models and clouds were done by George Gibbs and Richard Conway.

12-year-old won't leave the theater complaining that this maneuver was technically impossible because it broke the laws of A, B and C. We didn't have to worry about that in *Flash* because it's based on a 1930s space fantasy comic strip. Concentrating on the fantasy elements, however, created even more headaches for us in the special effects department.

"The rocketships, for instance, are not sleek and fast. They're like luxury liners. They move at a slow, steady pace



and look very art deco. It's all very intricate and detailed."

The FX director now turns his attention to the ways he and his crew created the otherworldly atmosphere of *Flash*. "The movie had to have a totally different look too. As much as I hate to use this word, I'd have to call it a *unique* look. Since it takes place in a universe you've never seen before, Ming's territory, everything had to look new and totally alien. Translated into practical terms, that meant that in practically every shot there had to be some sort of effect going on. If you had two characters talking in a room and there was a window in that room, you couldn't have conventional, earthly skies outside that

window. You had to manufacture one of the swirling skies of the Mongo galaxy. So in every scene that you had a window, a portal or an open door, you had to have a blue screen there so the outdoor effect could be added later. Even a rather conventional shot became an effects shot in this movie.

"There were a lot of effects in this movie that were just plain grueling to concoct. In the comic strip, the background action seemed quite normal in the context of the outer space setting. Getting that onto the screen? Hah!"

Van Der Veer begins to chuckle again, recalling the trials of filming the flying Hawkmen. "Geez. I mean, we had to have an army of Hawkmen that was capable of just zipping in and out of the skies with ease. Quite a tidy chore in a comic strip, but in order to convey that image on film... Instead of having to figure out how to fly one man realistically, the way they did in *Superman*, we had to fly seven or eight men at a time. Now, in addition to the problem of flying eight men at a time in front of a large blue screen [later to become a sky], you had to take into account the fact that each one of these warriors had wings that had to flap. With their wings moving, the men, who were suspended by wires, had a tendency to twist back and forth. And if they were carrying any weaponry, they not only twisted but they tilted! If we weren't careful, these Hawkmen would have looked like a gigantic mobile. So we had to hang extra wires to keep them from twisting while they were dangling there. Instead of having just two wires on each actor, you had four or five. Multiply that times eight per scene and you have a regular puppet show.

"In addition to that, in the finished movie, you have to see a whole army of these Hawkmen in a scene. So you have to shoot *another* layer of eight Hawkmen behind the *initial* layer. Then, another layer behind that. When they dive in the film, they swoop down in squadrons of eight, one behind the other."

Van Der Veer leaves the rigors of finishing that scene to the imagination, adding, "But I think we were successful. Brian Blessed, who plays Vultan, the leader of the Hawkmen, took his daughter to see a screening of the film. On the screen, she saw him suddenly swoop into space. She let out a yell you could hear throughout the theater. 'Daddy! You never told me you could fly!' I guess we passed the litmus test for effective effects on that one."

In the new, updated version of the Gordon mythos, football hero Flash

(Sam Jones), heroine Dale Arden (Melody Anderson) and scientist Dr. Zarkov (Topol), visit Ming's (Max Von Sydow) planet Mongo, the forest planet of Arboria, the floating palace of the Hawkmen and a host of other alien terrains; all of which had to be totally unearthly in terms of design and construction. Swirling skies, fast-moving moons and crescent planets were to be considered commonplace on this outing. And that commonplace look posed another set of problems for Van Der Veer and his able effects crew.

"This movie probably has more blue screen in it than any other movie in the history of film. We had to come up with new looks for atmospheres and geography alike. There are over 600 blue screen shots and I'm not including the ones that were edited out or re-done.

"We had some of the largest blue screens that have ever been built. The one that the Hawkmen were flown in front of had to be large both horizontally and vertically because we filmed them from so many angles and in so many configurations. It didn't take too many of them to fill up a rather large area because of their enormous wings. The screen was 100 feet wide and 60 feet tall which is, in anyone's terms, enormous.

"Now, in order to find a stage that can house a 60-foot-high screen, you have to do a great deal of scouting. Most places just can't handle that size. Since we were shooting in stages all over England, Dino tried to get the old 007 stage that was used in a James Bond picture a few years ago to house a massive ship/submarine complex. Well, they wouldn't let Dino have it. But Dino is a very determined person. Miffed, he said to them, 'I'm gonna get me my own stage. And it'll be a bigger than this one, too!' And, by God, that's just what he did. He found this airplane hangar that had been used for construction during World War II. You could fit three 007 sound stages in it. It was so big we almost had our own weather conditions in there. Anyway, he spent a lot of money fixing it up and adding support structures to house the various screens and stages. When Dino cares about a movie, he goes all out.

"The place was so big that, at the other end of the hangar, we had another blue screen that was 300 feet long and 35 feet high. Everywhere you looked there was a blue screen of some size or shape."

Adding to the general hilarity of recreating Raymond's surrealistic comic strip realm on film was the task of constructing physical sets to represent the different geographical quirks of Mongo,



The Hawkmen cautiously approach a downed spacecraft. The movie was filmed so that it would resemble a comic strip.

Arboria and the Hawkmen's sky city.

"The sets were a royal pain," recalls art director John Graysmark with mischievous glee. "They were so damned large! The Arboria forest was probably the hardest set because it wasn't *total* fantasy. With Mongo and the like, you could get away with illogical but pretty designs. But the forest was something that audiences could relate to; everyone knows what a tree looks like. Therefore, it had to be ultra-realistic in its own way. Okay. A tree is a tree, you think. But, nooooo. These are giant-sized trees, so the texture of the tree had to reflect its stature. The bark, for instance, had to be gigantic in its design. We couldn't just have a big tree with normal bark. We had to have a big tree with *big* bark. It confused quite a bit of the crew at first when it came to actual construction. The leaves, for instance, had to have an exceedingly rough surface texture. A leaf may look smooth when you glance at it with the naked eye, but when you take a peek at it through a microscope, the porosity is amazing. We had to show this microscopic detail in Olympian proportions."

In the midst of this well-orchestrated madness sat director Hodges and his

stalwart cast, trying to get through four and a half months of principal photography with as little angst as possible. "It was exhausting," admits Hodges. "One had numerous moments when one wanted to say, 'I'm going home now. Good-bye.' All the way through, I was never quite sure as to how the finished picture was going to come out. I was satisfied in my own mind with the way the movie progressed, but I had no idea as to how an audience would react.

"It was a difficult film in that you had to walk this tightrope between the one-dimensionality of a comic book and reality... or something approximating reality. We tried to get the actors to perform their roles as boldly, heroically, as possible. I started filming pretty much at the beginning of the story. So the introduction of Flash, Dale and Zarkov is played against pretty ordinary, realistic [realistic?] surroundings. By the time we were backed up against a mountain of blue screens, it wasn't like we were just starting out cold.

"The first part of *Flash* was like working on an ordinary movie. The actors got to know their roles and ease into them. By the time they had to act in front of nothing but blue screens and imagine

whatever it was they were seeing, they were pretty confident. To begin with, I absolutely loathed having to work around those screens. But when you started seeing the final scene pieced together, seeing the moons and the skies, then you could relax a little. You must remember that we were all playing against things that weren't going to even exist for another two months. We wound up shooting everything from the angles used in the comic strip frames themselves, not using the long lens at all. By not being able to move the camera a lot because of the presence of all these blue screens we were able to give the movie that feeling of being a big comic book page. Eventually, this painful procedure worked out as a plus."

Aside from the blue screen impracticalities, Hodges had to contend with some exasperating physical effects. "The hardest thing to shoot were the fight scenes in Ming's palace and the Hawkmen's city. They were incredibly debilitating. They were shot with handheld cameras most of the time. Because of the lighting used on the film, it was really hot in there. The actors were suited up in heavy costumes and being chased around by cameramen for days

and days. People were wilting all over the place.

"The forest scene of Arboria was also pretty traumatic to film. The set was huge; tree limbs all over the place. We got ourselves into a terrible mess on the very first day of shooting because we couldn't move the camera anywhere without hitting a tree. Fortunately, there were no major disasters on this film. Just a lot of little ones."

"[Production designer] Danilo Donati, for example, speaks no English. I speak no Italian. Most of the time we couldn't find the interpreter when we wanted to communicate, so we wound up pointing a lot and drawing crude little pictures on note pads. It was like two kids from different planets trying to set up some common language."

As alienated as Hodges may have felt on the set ("We had three crews: English, American and Italian... and one translator!"), the film's celluloid aliens provided some real headaches for the director. "The Hawkmen!" Hodges moans. "God! The Hawkmen. They were so difficult... although, in a bizarre way, they proved funny too. It was hysterical trying to coordinate their movements and get their wings to flap simultaneously. We tried everything to make it work. At one point, we even had little machines tied onto their backs to get those wings flapping. It was very painstaking to get them to fly correctly because they just couldn't hang up there on those wires forever. Offstage, for each one of the flying Hawkmen, there was a galaxy of people yanking on wires. It was really crazy to behold."

"On the ground, they knocked things over with their wings constantly. We also had palace guards on Mongo who wore beautiful suits with headpieces that they couldn't see out of at all. Danilo's costumes are always fantastic to look at but they're not the most practical designs in the world. Each day, we had a new costume for them. So just when they were getting used to the new gear, they'd have to don new suits. They were bumping into each other constantly in a very non-menacing way. I'm happy to say that none of that is in the finished film. If we had used some of our outtakes we would have had the first slapstick space fantasy."

Trying to make it all look easy beneath the wings, the headgear and the shadow of the omnipresent blue screen were the actors; a strange mixture of veterans and newcomers. Melody Anderson, making her big screen debut as plucky Dale Arden, recalls the production as being one large shock to her cen-

tral nervous system, having entered the fray cold... almost literally. "I received a call on a Friday morning and Dino told me I had gotten the role," she says while visiting New York. "I was horrified. 'Don't send me to Europe for five months! I don't want to go!' He talked me into it. I was on a plane Friday night and was shooting in Scotland on Monday."

Surrounded by oversized trees, flying men and ray guns of every size and shape, Anderson surrendered to the sur-reality of it all very quickly. "It wasn't an actor's picture," she says. "It was a special effects picture. You lose a little bit of the time that's usually set aside to prepare the actors because the special effects take so long to set up. It's up to you as an individual to get it all together."

"It was very hard to cope at first with all the blue screen. Not only did you have to react to things you couldn't see but you had no idea about what it was you were reacting to because you hadn't seen the sketches or effects designs. You don't really know how grand your response is supposed to be in a situation like that. It got to the point where we just did it, no matter how strange it seemed. At one point, we were all standing in this cold studio, with icicles dangling from the cables, reacting to a tropical vision we couldn't see."

The physical stress during this production was also pretty amazing. The costumes were magnificent, fantasy art deco, very close to the old *Flash Gordon* movie serials. They weren't designed to actually move around in, though. I wear a beautiful black wedding dress in one scene. Every bead in it was hand-sewn with a tierra to match. But the dress alone weighed 55 pounds!

"In between takes, there wouldn't be enough time to go back into your dressing room so you'd find yourself just standing there with this beautiful armor on. I did a lot of needlepoint, crossword puzzles and chatting. It was really like *The Twilight Zone*. Because of the costumes, many of the actors couldn't really sit during the breaks. Max Von Sydow had to wear this black collar that weighed 20 pounds. It's hard to relax while balancing that on your shoulders. The Hawkmen couldn't sit because of their wings so they had to lie on their stomachs to relax, like real birds. You'd walk off the set and there'd be 20 sets of wings sticking up from the floor... 20 men deep. Bizarre."

Anderson recalls some grueling moments in dealing with costuming. "The costumes also made the effects more difficult. At one point, I was sup-

posed to fly while wearing a skimpy, clinging skirt. Usually, when you film a flying shot, you get to wear a big, bulky harness with two hooks in it, one on each side. That holds you aloft. With this dress, however, that sort of harness would have shown. They had to put the hooks on the back of the harness, which means there's a lot more tension on you while you're dangling there. The harness was designed for the costume, not the comfort. It was cold in the studio and we had to have wind blowing on us. You'd be hanging up there for ten or 15 minutes. I'd take off my harness at the end of the shot and walk off stage feeling like I'd been on a horse for 13 hours. I had a pretty unique straddle."

"I shouldn't complain, though. Poor Sam Jones. When he wasn't acting, he had to train to keep himself in shape all day. He had fight scenes where he was dunked in cold water and tossed into walls. Despite his physical condition, he was covered with bruises."

When asked to recount any humorous incidents on the set, the slender actress laughs aloud. "It's funny," she says, "all I remember is the pain."

After two years of pain, in various degrees and on various sound stages, *Flash Gordon* is finally in good enough shape to meet his movie public for the first time in four decades. What can audiences expect from this new, improved legend? Just about everyone concerned with the picture agrees on this point.

"People shouldn't come into this expecting a very sophisticated science fiction picture," Melody Anderson cautions. "It's a big kids' movie. It's a lot of fun."

"It's an innocent film," echoes Hodges. "Movies today are just so knowing. It's depressing. This movie tries to recapture the sense of innocence that childhood can bring. It's pure entertainment."

Perhaps it's effects wizard Van Der Veer who sums it up best. "It's a timeless film," he states. "A trip to a never-never land. It's a marvelous picture for a kid to see. I went to the Dallas sneak preview; a matinee. Children crowded the theater; children are a remarkably honest audience. They go into a film without any preconceptions and only react to the things that strike them as being true. They picked up on the exaggerated style of the film immediately. They knew it wasn't meant to be serious. It didn't frighten them. They hissed Ming. They cheered Flash. It was a genuinely pleasing experience to be part of. This is a marvelous picture for a kid," he repeats. "For the kid in us all."



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Trying To Cook Our Goose

Ken Bossong is one of the militant anti-techs who has devoted his life to keeping us chained to this planet. Working with phony "facts" and shameless distortions, he leads the Coalition Against Satellite Power Systems, a Washington lobby dedicated to stamping out power satellite research.

Solar power satellites (SPS) have been proposed as a possible solution to the energy crisis. Taking advantage of the abundant sunlight and free fall of space, researchers believe we may be able to build giant gossamer structures which would harvest the sun's energy and beam it down to an energy-starved Earth via microwaves or laser.

Why is Bossong trying to kill power satellites?

According to Bossong's "Citizen Groups' Statement," which is the manifesto of the wreck-SPS mob, "SPS technology is very expensive; it represents a concentration of control and power in the hand of the federal government and large industry; it poses severe environmental risks; it is a highly complex technology; and its potential for use as a military target or weapon, as well as its reliance on raw materials that would have to be imported, make it an insecure energy source... [SPS] is inconsistent with most of the principles upon which the support for a national solar program is based."

What was that again? "SPS technology is very expensive." How, pray tell, does Bossong know what a power satellite will cost? Unless he already knows every possible invention and improvement we will make in space construction as we develop the SPS concept, I'm hard put to see how he obtained his olympian certainty that we're not going to make the grade. In 1910 Bossong would have headed the Coalition Against Commercial Airlines because "airplane technology is very expensive."

"It represents a concentration of control and power in the hand of the federal government and large industry." Bossong, of course, in that same manifesto calls for decentralized Earth-based solar, a technology so free from big government that the Solar Energy Research Institute has to publish a 3/4 inch thick volume of the *Solar Law Reporter* every



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two months to help the guy who wants the sun to heat his water stay two jumps ahead of the law! And how about this large industry stuff? When you want to get your decentralized home clothes washer or stove or refrigerator, do you call up your neighborhood refugee from the '60s and pay him to cobble together "small are beautiful" contraptions on the spot? The day I buy a solar water heater it will be from one of those horrible industries with low prices, a record of good performance and a guarantee that will stick.

"It poses severe environmental risks." Wait a minute here. I have read every environmental assessment done to date on SPS. Bossong was even a participant in some of them. Nowhere did I see any "severe environmental risks." In fact, I uncovered statements such as: "Of all major proposed power production systems, [SPS] is the least likely to have regional and global weather and climate effects." Okay, I agree that we

should keep our eyes peeled for as yet undetected environmental hazards. But, darn you, Mr. Bossong, we haven't found any so far that fall into the "severe" category.

"It is a highly complex technology," complains Bossong. Heaven forbid us elitists should get to use technologies those less fortunate than us can't understand. Bossong's complaint reminds me of the burnt-out hippie who told me he was a solar energy researcher because it was the only technology he could understand. These tens of thousands of cheerfully ignorant inventors have brought down a landslide of laws designed to protect the consumers these angel dust cases have bilked.

"Its potential for use as a military target..." Ken, where have you been since Hiroshima? In this era of Mutually Assured Destruction, every man, woman, child and puppy dog is targeted for nuclear destruction. What's so special about SPS?

On August 11, 1980, Bossong finally landed a solid low blow to SPS. He had just completed getting feedback from that group of anti-nuclear decentralized solar advocates that he was surveying for the Department of Energy. The object was to find out every kind of objection the anti-techs could raise against SPS. Not surprisingly, Bossong learned that a whopping 85 percent of them opposed SPS. So he rushed out a press release which gave the impression that he had conducted a public opinion poll for DOE, and lo and behold, The People hate SPS! Headlining "Satellites for Power Unpopular in Survey," United Press International picked it up and splashed the story across the nation.

L-5 lobbyist Leigh Ratiner and I put together the real story and passed it out to the press. The facts were that the Forum for the Advancement of Students in Science and Technology had done another survey of 3,000 college students and professors, and I had directed a study of 3,000 L-5 members' responses to DOE's SPS program. Although these two studies were designed to get complaints and suggestions for change, we discovered that 90 percent of the FASST group favored further research on SPS, while fully 95 percent of

(continued on page 67)

CRYONICS MELTDOWN

Are those investing in cryonics being frozen or getting burned?

By BARBARA KRASNOFF

Most people don't really want to die. Of course, a few might start telling you about maintaining the diversity of the species, or keeping the population down, or how *boring* it would be to live 500 years. But, all in all, these arguments have something of the taste of sour grapes about them. After all, what other choice do we have?

For the last decade or so, a group of people have been coming into the public eye by asserting that we *do* have a choice. By preserving one's body when what they call "de-animation" occurs until a cure for whatever de-animated you can be found, you might have a very good chance of lasting a lot longer than you expected. Perhaps forever.

The method by which they propose to preserve themselves until that happy day is called "cryonics"—a term derived from the Greek work *kryos*, meaning ice cold. While the idea of cryogenically preserving human tissue is not new—experimentation in the freezing of human sperm began in the late 1940s—it wasn't until Robert Ettinger published his work *The Prospect of Immortality* that the possibility of freezing human beings for later reawakening began to germinate in people's minds.

One of those caught by the idea was Art Quaife, then a student in mathematics at the University of California at Berkeley. He became convinced that, through cryonic storage, humans otherwise doomed by their mortality could have a second chance at life. "I want to live forever," he states sim-

ply. "At present, cryonics offers the only alternative to the grave and oblivion. And I see nothing good whatsoever to be said for the state of oblivion. To people dying today, cryonics offers a choice."

So in 1968, Quaife teamed up with a group of other "immortalists" to form the Bay Area Cryonics Society, a non-profit research organization. Four years later, says Quaife, "the most active members of the BACS decided that, rather than simply talking about being able to suspend people, we ought to have the capabilities of doing it. So we formed a commercial firm to raise the money to do that." Trans Time was born.

Simply put, cryonic storage involves the freezing of a person who has just been declared "clinically dead," but in whose body actual biological deterioration of the tissues has not yet taken place. When that person has previously made arrangements for suspension, the body is immediately packed in dry ice, a heart and lung resuscitation machine is attached to keep oxygenated blood flowing, and he/she is shipped off to the Trans Time facilities.

At their laboratories, the Trans Time technicians inject the suspandee with a solution of dimethylsulfoxide to prevent tissue damage. The body temperature will, through a series of stages, be gradually brought down until it reaches minus 196 degrees C (minus 320 degrees F). At this point, it is believed that normal deterioration of a body after it has ceased functioning is effectively stopped.

The patient is stored in a stainless steel

capsule filled with liquid nitrogen. He/she is then officially in what is called "cryonic storage." According to Trans Time, if the capsule is properly supervised and maintained, there is a chance that, one day in the future, a cure will be discovered for whatever ailed him/her and a sort of rebirth will take place.

Of course, there is no assurance of that. "I don't know any way to calculate the odds of their being revived," admits Quaife. "I can say personally that I am optimistic about their chances of revival, but I would say that even if they have very little chance, that it's still better than no chance; and I think that being buried or cremated offers virtually no chance."

Trans Time has been operating since 1972. In that time, it has become responsible for the steady maintenance of nine cryonically preserved patients: six full bodies, one brain and two heads. (The idea behind the latter is that a new body may be cloned from preserved cells; or that the brain will be transplanted into an altogether new body.) Some 104 people have signed up, through various non-profit organizations such as the Bay Area Cryonics Society and Alcor, to be preserved by Trans Time once they have been declared legally dead.

However, while the folks at Trans Time are very serious about their plans to conquer death, recent developments have caused the public to become a little more wary of cryonic interment.

On June 10, 1979, a story appeared in the California newspaper *Valley News* disclosing the discovery of an abandon-



ed cryonic storage crypt at the Oakwood Memorial Park Cemetery in Chatsworth, California. Reporter David Walker described a foul-smelling, warm, deserted room, filled with empty cryonic capsules and littered with aluminum foil, surgical gloves and body bags. It also contained several decomposing bodies.

What happened?

In the mid-1960s, a man named Robert Nelson formed two organizations concerned with cryonics: the Cryonics Society of California, a non-profit membership organization; and Cryonic Interment, which offered cryonics services on a profit-taking basis. The history of these two organizations, according to an article written by Quaife for *The Cryonicist*, is not a distinguished one. Many of the original members of SCS and CI, disturbed at the secretive nature of Nelson's dealings with both the public and his own colleagues, broke away to form new organizations; and already-existing cryonics membership and service organizations tried to have as few dealings with him as possible.

Meanwhile, CI accepted the bodies of ten recently dead people, including at least two children, for preservation in

their Chatsworth vault.

One of those patients was the mother of Terry and Dennis Harris, two brothers who, in 1970, gave the remains of Mildred Harris to Cryonic Interment for suspension. According to the brothers, they also gave in excess of \$10,000 to Nelson's firm for that service. They are now suing that company for \$10 million in damages, in concert with several other relatives of abandoned patients.

Art Quaife, concerned that the CSC/CI fiasco would affect the running of the more legitimate cryonics operations, looked into the matter and reported his findings in the aforementioned *Cryonicist* article. Apparently, most of the capsules containing patients interred by CI had been without the necessary liquid nitrogen supplies for many years, and one body had not even been placed in a capsule. And while some of the relatives of the (now truly) deceased had not provided sufficient funds to ensure proper maintenance, several others had been paying Nelson money for services not rendered, and at least one said that he had been assured by Nelson of perpetual care for his relative.

It cannot be denied that the emotional

burden these people have had to bear in having to literally bury their relatives for a second time is enormous. Back in June of 1979, reporter Walker quoted Nelson as saying, "I never promised anything. They were told they would be frozen for a period of time. Five minutes is a period of time." Whether or not Nelson is truly responsible for the Chatsworth situation will be decided in the courts.

Nelson's company is not the only one to have had difficulty in maintaining bodies entrusted to it for storage. Cryonic societies in New York and New Jersey were forced to close (and the bodies either buried or sent to other facilities) when they ran out of operating money. Quaife believes that most of these operations are not really guilty of fraud—just lack of foresight.

"You've got to properly fund your [cryonic] suspension," he explains. "Now, as much of a rascal as Nelson was in Los Angeles (while most of the blame has to go to him, not 100 percent of it does), many of the people who were suspended there hadn't made the necessary financial arrangements in advance; and unless you do, your chances of remaining in suspension are slim or none. You've got to provide funding. And people who become suspension mem-

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STARLOG's Space Art Advisor, Ron Miller (author of *SPACE ART*), has contributed a brief biographical sketch of each artist in addition to the artist's own description of the astronomical scene depicted.

PERFECT GIFTS

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1. A patient declared legally dead is packed in dry ice to preserve his body until the preserving process begins.
2. Art Quaife, the president of Trans Time, Inc., helps affix a prepared cryonics patient to a special stretcher.
3. Once the patient has been brought down to the correct temperature, he/she is slid into a cryonics capsule.
4. The capsule containing the preserved human is filled with liquid nitrogen to maintain its low temperature.



bers of BACS or Alcor (another organization that we're responsible for), or the Cryonics Society of South Florida, provide the necessary funding to place and maintain them in suspension."

It must be initially realized that cryonic storage, complete with a full-sized stainless steel capsule, constant replenishment of liquid nitrogen and salaries for qualified technicians, is costly. Describing how someone would make proper arrangements for eventual suspension, Quaife says, "You would become a suspension member of an organization like BACS. You would pay a \$1,000 initial membership fee. You

would fill out various legal documents authorizing your cryonic suspension. We recommend that people buy the minimum of \$60,000 worth of funding and most people do that by taking out life insurance policies."

However, in spite of careful precautions by Trans Time and other similar cryonics societies, some of the tar from the SCS scandal has wiped off on them. For example, charges have been made that the cryonics organizations are preying on the elderly and ill, and their fear of impending death. According to Quaife, the membership of BACS doesn't indicate that type of situation at all. "When people first sign up," he ex-

plains, "I think they tend to be younger, say in the age group of 25 to 35. Especially among our most active members, we have a high proportion of people in the physical and biological sciences, physicists, computer programmers, engineers, biologists, mathematicians...."

John Gill, secretary of the California State Cemetery Board, has publicly expressed his belief that any efforts to

(continued on page 66)

JON HASSELL

Fourth World Musician

"We've been traumatized by words in our society, we've O.D.'ed on them. Words are useful tools, but they can also numb you to the experience of what they express. For instance, I can say 'love' a million times without ever having to experience what it really is. It's this realization of our over-dependence on language that I think will be the hallmark of the coming age."

Those carefully chosen words belong to musician Jon Hassell, a man with a unique vision of music in the modern world. By training, Hassell is a classical composer/trumpeter, but by inclination he is equal parts unorthodox thinker and technical innovator. Jon's third and latest recording, a collaboration with rock avant-gardist Brian Eno called *Possible Musics* (on the Editions EG label, catalog number EGS 107), is the first volume in an open-ended series exploring what the composer calls "Fourth World" music. Jon explains, "It's a term I use to describe the sound that is one step beyond 'Third World'; it is music that is a fusion of the primitive and the futuristic. It combines elements of the world's traditional ethnic musics with current technology to produce a unique and authentic contemporary sound." What Jon neglects to add is that Fourth World music is quite possibly the first truly international music of Planet Earth.

Jon Hassell's roots in the avant-garde extend back to the mid-'60s when, armed with an advanced degree from the Eastman School of Music, he headed for Germany to study with Karlheinz Stockhausen, a figure of towering importance in electronic music. He did further study



By LOU STATHIS

at the Studio di Fonologia in Milan, Italy, and then as a Rockefeller Fellow at the Center for Creative and Performing Arts in Buffalo, while later playing with such notable members of the modern music vanguard as Lukas Foss, Terry Riley and La Monte Young. In 1969,

Jon began work on his *Landmusic Series*, a group of planned conceptual sound installations published in 1972. The series consisted of a number of event ideas, most unrealized, that in various ways creatively altered a listener's sonic environment. Examples include surf sounds piped into the desert from buried speakers, crowd noises from the 1936 Berlin Olympics played in an empty stadium during the Munich Olympics, and trees in Central Park wired with microphones to amplify the sounds that resound naturally around them (wind, squirrels, etc.). Jon's 1970 work, *Solid State*, is a 50-minute study of the almost physical interactions of sound produced by two synthesizers. But since 1972, Jon Hassell's music has taken a decidedly different, and more elemental direction. It was in that year that he encountered the Indian vocal master Pandit Pran Nath.

As Jon remembers it, "I was playing then in La Monte Young's 'Theater of Eternal Music' at an arts festival in Rome. Both Terry Riley and La Monte had been studying with Pandit Pran Nath, and they had also been sponsoring him in a way. I had been off the trumpet for a few years, and had only recently decided to pick it up again to pursue directions I hadn't before. At the time I was thinking jazz. That was until Pandit Pran Nath heard me playing some figures and began to sing them back at me. He just reeled them off, doing circles around what I had done. I was inspired."

Jon immediately began studying with the master, following the traditional Indian method of listening and repeating. The difference, however, was that Jon

used his trumpet to duplicate what Pandit Pran Nath sang, which was not all simple. "I came up against the limitations of the trumpet—which until recently has been basically a rooty-toot-toot device. Jazz players, like Miles Davis, have extended the expressive capabilities of the trumpet in the areas of pitch bending and such, but very little has been done so far as a thoroughgoing approach to shapemaking is concerned. And if anything, Indian music is the science of shapemaking, on both the micro and macro levels. On the micro side, Indian music requires that one have command of *all* pitches—not just the white notes on the piano, say, but everything in between. On the macro scale, the shapemaking is in the overall form of the raga, which is determined by its purpose, the time of day it is designed for, etc."

Jon soon found Pandit Pran Nath's music exerting a profound influence on his own, not surprisingly at both the micro and macro levels. "I suppose you can say that I am attempting to use my lips in the way he uses his vocal chords and voice—that is, my lips have become a vibrating membrane. The distinction between my technique and that of the traditional trumpet is that I'm using the horn as a resonator as well as using it to vary the length of a vibrating air column. It's as if I were buzzing the mouthpiece into a large chamber—like a jug—such that there are no bumps or slots where the overtones lie, as with standard valve technique on a vibrating air column." If that doesn't quite make it crystal clear, Jon offers a simpler explanation: "You could say that I'm singing with my lips."

On the macro level, Jon has found that the structure of Indian music lends itself quite nicely to his technological avant-garde approach. "In a raga, there are characteristic phrases called *tanh*, which embody the basic melodic forms that give the raga its identity. The tanh relates to a DNA message, in that it contains most of the vital information of all the forms within that raga. In my music the role of the tanh is played by tape loops, repeating figures that are the matrix out of which the rest of the piece grows. The more I study a tape loop, the more I see in it. It's like a crystallization process, where a certain range of implied ideas forms itself around the loop." Hence the basis of Fourth World music: a primal and universally valid form of music fused with the sensibilities of a sophisticated musical sense.

Why has Jon found it necessary to reach back to elemental forms for in-

spiration? "In Western culture," he begins, "no music in which improvisation plays a major role is considered 'classical.' Furthermore, anything that is openly sensuous and/or uses certain rhythmic inflections or even certain instruments is automatically relegated to some 'low' category (jazz, rock, mood music, etc.). Obviously, a kind of cultural racism is at work here, which more often than not reduces non-European things to curio status. Consider that in India, Africa and many other cultures (if any separation between classical and popular exists at all), classical music is sensuous, it's built over highly-inflected ('jungle') rhythms, improvisation plays a major role, expressing a mood is a primary goal, and it communicates to all classes of people."

But at the same time, Jon recognizes the danger in the strictly purist approach. "The pitfall is the temptation of total immersion in the traditional discipline, and not moving beyond it. Learning it, but also staying within its limitations; becoming so entranced with it that you don't want to learn anything else. I can see that things change, that things do develop. One can't imagine that progress will stop and that will be the end of all possibilities. On this planet, with a certain atmosphere that determines all aspects of sound transmission, there are certainly lots of ways to organize vibration, lots more than to think that in the future there will be just unimaginative extrapolations of present methods. I'm reminded of episodes of *Star Trek* where music was being played, and the instrument used was nothing more than a strange guitar, a slightly mutated traditional instrument.

"Vibrations are the essence of life, and at its highest, music echoes that—it speaks to us on a very basic level. But good music can never be schematized, because it's too subtle. It's like life; you can't get too close to it, because if you grab hold it's suddenly gone. You've got to stand back, give it room and learn what feels right. That's very intangible, but it's a human instinct that's always operative (we think of it as a person's 'style'). Pure music, of which Pandit Pran Nath is the highest example I know of, could be defined by how deeply one comes to expressing the vibrational resonance that music has the ability to touch in us. And achieving that takes a great deal of hard work; you can't simply decide you're going to do a thing like that."

Jon applies the same hard-nosed, puritan work ethic to the music of others that he brings to his own. Though he

finds much of value in current new wave rock hybridizations (in fact, he contributes a strikingly beautiful trumpet solo to the new Talking Heads album), he confesses that too much of it strikes him as lacking in precision and structure. "There's a lot of what I call 'Late Show mentality' in New Wave—switching channels from show to show, through different periods and styles. Look at a commercial break during a movie: within a couple of minutes you are taken through ten different styles of music. What that does on one hand is fragment attention so that nothing but fragmentation can be expressed, while on the other hand the harmonies of one become superimposed over the harmonies of the others. It becomes like Xerox art—it's there, so you just snip out pieces of it and put them together with pieces snipped from elsewhere. The problem is, as it always has been, how to create something that has feeling, balance and somehow speaks to the listener."

The idea of music as a meta-language, going beyond words, is an important one to Jon Hassell, and he worries that the essential communication of deep human feeling that it offers is in alarmingly short supply. "Things have gotten to the point where, as R.D. Laing pointed out, insanity has become the norm. We insist on acting as though the dynamics of small tribal situations can work with the vast amount of people we have in our society. That simply isn't true, and it's becoming increasingly obvious. You could say that we've reached a limit of verbal communication, and music is one way to overcome that. If you can say that we are evolving toward non-verbal communication — that we've reached a brick wall of conceptualizing with words—then human instinct is telling us to reach back and find a place with real feeling. Music is rooted in speech inflections, body rhythms (like the heartbeat), and the sounds of our environment and atmosphere—so it is both everchanging and eternal, primitive and futuristic.

"If I can just present a model of some of these ideas, namely an integration of forms that gives some sense of the possibility of extrapolating other forms, that's one small accomplishment. Practically, I might be doing more if I were helping to feed Cambodians, or doing something where I could say that one person is better because of what I've done today. The other side of that, though, is that art touches large numbers of people, and does actually change things. It can be revolutionary."

THE ALTERED STATES OF MOVIEMAKING

In Ken Russell's new film, special effects bring a scientist's hallucinations to cinematic life.

By ED NAHA

When award-winning dramatist Paddy Chayefsky published *Altered States*, his first novel, in 1978, the major criticism concerning the work in literary circles was that it resembled a screenplay more than a work of fiction. When *Altered States*, the movie, appears in theaters next month, author Chayefsky's main criticism will be that the finished film doesn't bear enough resemblance to his original book. From the outset, *Altered States*, in all of its various forms, has been problematic.

Chayefsky, best known for such plays as *The Tenth Man* and films like *Marty*, *Hospital* and *Network*, surprised his fans by turning to speculative fiction for his first novel; tracing the de-evolution experiments of Edward Jessup. Through a series of routines largely involving isolation tanks, Jessup's mind and, eventually, both his spiritual and physical selves travel to various planes of existence. The book seemed a natural for the wide screen and Chayefsky did the required adaptation. An artistic difference between the author and the film's director Ken Russell, however, led the writer to walk off the project.

In the final film, protagonist Jessup will duplicate all of the out-of-this-world action his literary counterpart experienced in the novel. Quite a trick. Being transformed into cosmic energy or mutating into another stage of the evolutionary process is a somewhat simpler affair to behold on a printed page than it is on the screen. What can be described in intense prose has to be shown before a camera lens. Should the process be hokey, the audience won't buy it. Sophisticated moviegoers simply will not accept a tense, dramatic narrative that suddenly leaps into a *Voyage to the Bottom of the Sea* day-glow effect. Director Ken Russell realized this and, so, midway through the project, called in 27-year-old effects/photographer/computer expert Bran Ferren to help him design some of the visual effects. Ferren's job eventually boiled down to this: Come up with an entirely new optical effects process to create some of the most dramatic special effects ever to grace the screen.

Now, seated in his Manhattan headquarters, surrounded by the offices of a dozen optical expert peers, the bearded Ferren points to a series of bizarre human transformation storyboards used in the film. The storyboards themselves are remarkable. Hanging around his office like scattered sheets of notebook paper, they resemble a rather





Altering the state of special effects was the chore Bran Ferren accomplished for director Russell in *Altered States*. With the assist of computer scans, rotoscoping and human ingenuity, Ferren and his crew achieved the evolutionary metamorphosis of Dr. Jessup, as shown above and on the preceding page.

perverse cartoon. Instead of Mickey Mouse getting a hotfoot, we have a professor getting hot... exploding into particles.

"It turned out to be quite a movie," Ferren says with an offhand smile. "In this movie you see *everything*. There are no shortcuts taken. When you go to the theater and watch this movie, you will be seeing the integration of over a dozen separate technologies; many being used in film for the first time."

Initially, Ferren had no idea he would inherit *Altered States*. He was called out to Hollywood to supervise merely the physical effects (his Broadway wizardry in the Sherlock Holmes play, *The Crucifer of Blood*, being legend—giving shocked audiences onstage sea chases, thunderstorms and quick cuts from Egypt to London).

"I met Ken Russell and we started working out the effects," remembers Ferren. "The approach I took was to emulate magic wherever possible; make extraordinary events seem ordinary. That makes the camera just another observer. When we needed energy rays streaming through the air, I built energy rays."

When Russell saw Ferren's effects, he invited him to stay and work on the opticals in post-production in order to give the film a cohesive effects look. The problem was that the movie had so many intricate transformation scenes, with humans entering various cosmic fields

of existence, that traditional effects just wouldn't do. Usually, a film relies on blue screen matte work to pull off complex effects scenes. In *Altered States*, however, that process was impossible to use, which pleased Ferren.

"I'm extremely critical of things like matting," he bristles. "It drives me up a wall to see those things on the screen. I'd say that over 50 percent of the blue screened and matted effects I see annoy me. I have to temper this by the fact that most moviegoers don't notice it. But I notice it, damn it all, and it makes me crazy."

"What we had to do in *Altered States* was work on a lot of scenes that were already shot. In other words, we had to alter a filmed image already on film. Now, most moviemakers usually want to use existing methods and technology to do the effects the simplest and cheapest way possible. That is, quite often enough, the best way to accomplish things. But the problem with this movie was that there was no technology or existing sets of technologies that would give us the freedom to adjust filmed images after the fact."

"For example," Ferren elaborates, "if you're aware of what your special effect is going to be in advance, you can set up your typical blue screen shot; a shot wherein a portion of the scene will be matted in later in a traditional manner. You're working with the people stand-

ing in front of the blue screen and later you're going to substitute a different background. You can coordinate the lighting of the original photography with the light you know will exist in the background scene later. If you really get your act together, you can do a blue screen shot that will show up pretty accurately on the screen."

"But we were faced with the somewhat all-consuming problem of having actors in a room and wanting to simultaneously change the room or change one of the people in the room or change the shape of one of the people in the room without affecting the rest of the background."

"We developed a set of techniques that was used throughout the film, particularly in the transformation scenes, where we were able to use computers to help us out. It was pretty involved."

Ferren leans back in his chair and points to the story-boarded sequence wherein the main character begins to metamorphose into an energy being. "One character had to turn into cosmic energy," he says. "Now, I've never seen anyone ever do that on the screen, so before we could even consider working on that scene, we had to come up with a number of concepts showing what that transformation should look like; what it would be credible to look like in terms of the rest of the story and scientific plausibility. I'm not saying that the final transformation is scientifically accurate,

because no one has ever really metamorphosized like that in real life, but I can give you enough factual back-up in terms of the way energy particles move, the way they look, the way they decay, so that it all makes sense in regards to our current understanding of physics.

"After we designed the look, we had to work on the scene itself: Our character is sitting in a room and you're supposed to see him break up into a form consisting of cosmic energy. The energy form is going to consist of a luminous, iridescent body. This body is going to consist of thousands of little particles which are changing color and intensity as they follow the form of the person. At the same time, just to make things interesting, the person's body will be moving because of the violent activity of this transformation. The particles' colors will change within the figure depending on how fast the figure is moving and how close it's getting to other objects."

Ferren rubs his hands with obvious glee. "The first thing we have to do is go through the scene and, with a computer, remove the figure from the background elements. We can't begin to do anything until we know the difference between the figure and the floor.

"We take the figure and the computer scans it. We then rotoscope it, take it out of the scene, either via the computer terminal or by conventional rotoscoping means. The computer then only has to concentrate its high-resolution look over the area that will change. Once the figure is rotoscoped, we have the man separate from the room.

"We take the man and with the

rotoscoping, do an equivalent matte of the figure. From that point on, with computer processing and data-reduction techniques, we take that guide matte and make it conform to the scene. The computer 'knows': 'Okay, somewhere within this indication is a boundary. Determine where that boundary actually is from frame to frame.' This gets tricky because if a person moves quickly on the screen, his body blurs and, frame by frame, that boundary no longer exists. You find that, with a blurred image, a hard matte line is not the best answer. You have to come up with a simulated blur to match the image you're putting in. The computer, essentially, is doing the somewhat inhuman task of making all this work. It's not a straightforward process."

Ferren returns his gaze to the storyboards. "Okay. Now we have a variety of mattes for this person's body. And the mattes, blurs and all, are not all that routine. For instance, if the person is glowing and passes a wall, that glow has to be cut off hard on that part of the body that goes behind the wall. So you have a soft matte with a hard edge on one area.

"The person is now isolated from the rest of the scene. Now we have to figure out exactly what kind of visual is going to fill this person up. We generate an energy pattern either directly by computer synthesizing or by modifying an existing image to come up with our energy dots, our 'fleckles.'

Ferren points to an outline of a human filled with little triangular dots. "We now have to come up with a method of figuring out how they move and how

that changes in relationship to how they're illuminated. Which fleckles will be sources of light and which ones will be reflectors? When they move, will they stay the same color or change? Then you have to take these fleckles and combine the right color combinations to come up with the final hues you want.

"We haven't even gotten to our scene yet. We're still building it up to see what it will look like. Now, because we've decided that we want this effect to be sort of an iridescent, gaseous thing, the fleckles just can't stop at the edge of the skin. So we have to figure out just how these little fleckles will fly out into the air. Are they opaque? Do they trap light? Do they change the color of the light around them? Do they spill off into the background scene? How many mattes will we have to computer generate to make that effect of the light interacting with the existing background?

"By now, we have a lot of mattes kicking around here. We now have our form isolated and we know what the energy field will look like. We then determine what this field will do in relationship to time. In other words, as the person moves his arm, do we want the glow to change from reddish to blueish? Once we decide that, we have to transfer those color changes into the mattes that go into making up the arm.

"And...since the figure is moving, we have to also come up with blurred fleckle mattes and color mattes. Now we have fleckles and figure. What we have to worry about is how to come up with these snazzy images. Our fleckles are generated by computer, based on what is called image processing.

"But before we actually make our fleckles, we have to know how they are going to appear and spread. Will they start inwardly and spread outwardly or what? Once you figure this out, you go back and say to the computer: 'Okay, you have to generate mattes that will let us go from scene A to scene B.' It's the same process that was used in doing image wipes in old movies, where a line moves across the screen and changes everything from one scene to another. Instead of having a line sweep across our transforming figure, we're going to have him fleckle out.

"The computer takes our requested fleckle pattern, which in this case is triangular. Over a period of frames, it generates particles, building them frame by frame. The computer produces a high population [of fleckles] and allows the pattern to spread outwardly. We work

PHOTOS © 1980 WARNER BROS. INC.



Makeup wizard Dick Smith (left) and director Russell inspect an "effect."



ARTWORK © 1980 STEPHANIE O'SHAUGHNESSY

harlan ellison

AN EDGE IN MY VOICE

Every now and then, when I'm confronted with one of the seemingly endless manifestations of obscurantism and institutionalized superstition that pass for "common knowledge" in our ever-increasingly complex world, I grow despondent and find myself thinking unworthy thoughts about the wad that we call the Human Race.

I find myself shrugging and saying (inwardly), well, hell, we've had our shot, now let the cockroaches take a whack at it. God knows they've been around a lot longer than we have. So what if they haven't produced the orthopterous version of *Hamlet*, or invented the aerosol spray; neither did the saurians and they maintained occupancy for 130,000,000 years, give or take a wild weekend. Maybe, like the dolphins, cockroach art and society function on levels non-interpretable by limited human minds.

The word *limited* persists in these reflections when I lay out the cards of contemplation and consider how many people believe in irrationalities like alien spaceships that kidnap Georgia rednecks just to tell them Jesus Saves; that fluoridation of city drinking water is a Communist plot to pollute our precious bodily fluids; that skyscrapers "sway" in the wind as much as eight feet; that Shakespeare's 16th century rival, Anthony Munday, wrote *The Booke of Sir Thomas More*, rather than The Bard;

that great and original art can be created while the artist is doped out of his brain on Quaalude; that Ernest Angley, Oral Roberts, Jimmy Swaggart or any of the other members of television's God Squad can cure cancer or even a hang-nail through Divine Intervention; that jogging for anyone over the age of thirty-five will produce any systemic health benefit except a tragic and painful osteomyelitis; that the actors on the soaps are actually real and living those lives of endless *sturm und drang*; that Atlantis still exists in a sub-oceanic cul-de-sac waiting to be discovered; that est or Self-Realization or Scientology or any of its whacky clones can do anything more for you than separate you from large sums of money; that Nobel prize-winning physicist William Bradford Shockley's naive and simplistic (but nonetheless mischievous and racist) theory of dysgenics, "proving" blacks are inferior to whites, is any less wrongheaded and damaging to the human spirit than Anita Bryant's contention that all Jews are doomed to Hell from birth; or that Marilyn Monroe was murdered as part of the assassination conspiracy that punched JFK's ticket.

To this admittedly inadequate catalogue, by no means even the apex of the pinnacle of the tip of the iceberg of fallacious codswallop proffered or swallowed whole hookline&sinker by a distressingly geocentric human race, can be added your own freighting of favorite misconceptions and irrationalities. I urge you to make a list of your ten favorites and send them along *on a postcard*, no letters, postcards only... and I'll put them together some time soon so we can all share each other's craziness.

What brings all of this to mind right now are two stretches of writing that have come under my gaze, and a snippet of television news footage I caught the other night.

The writings are: first, a splendid book titled *Astrology Disproved* by Lawrence E. Jerome; and second, two entries by the indefatigably logical Dr. Asimov.

Of the former, I cannot say enough. Jerome is listed as an engineer and science writer who had done extensive research in astrology, but such usually thin credentials don't bother me one whit as regards this extraordinarily sen-

sible and powerful weapon in the ongoing war against the forces seeking to keep us stupid. Why? Because Jerome is the co-author of the "Objections to Astrology" statement signed by 192 leading scientists whose credentials are unassailable. The statement, incidentally included at the end of the volume as an appendix, contains signatures by 19 Nobel Prize winners, among which are those of Sir Francis Crick, Konrad Lorenz, Linus Pauling, Harold C. Urey and Sir Peter Medawar. And the statement says, in part:

"Scientists in a variety of fields have become concerned about the increased acceptance of astrology in many parts of the world. We, the undersigned—astronomers, astrophysicists, and scientists in other fields—wish to caution the public against the unquestioning acceptance of the predictions and advice given privately and publicly by astrologers. Those who wish to believe in astrology should realize that *there is no scientific foundation for its tenets.*" (The *italics* are mine.)

I won't quote the entirety of this wonderful, responsible document, but will merely add this part...

"Why do people believe in astrology? In these uncertain times many long for the comfort of having guidance in making decisions. They would like to believe in a destiny predetermined by astral forces beyond their control. However, we must all face the world, and we must realize that our futures lie in ourselves, and not in the stars."

"One would imagine, in this day of widespread enlightenment and education, that it would be unnecessary to debunk beliefs based on magic and superstition.... This can only contribute to the growth of irrationalism and obscurantism."

...and having put down these words by scientists far more knowledgeable than I, will urge you to get hold of this book. Knowing the usually slovenly practices of many bookstores, when it comes to ordering a book not presently vying with Judith Krantz or Harold Robbins for a spot on the bestseller lists, it behooves me to advise you that Jerome's book can be ordered through the publisher: Prometheus Books, 1203 Kensington Avenue, Buffalo, New York 14215. It was published in December of

1977, runs 233 wonderful pages, and costs \$14.95—which is a chunk of change, I'll agree, but is one of those books into which you'll dip again and again, especially to get rid of the twinks, flakes and oddballs who ask you, "What's your sign?"

(I make a practice of answering that question, at parties or when confronted by people who put themselves instantly beyond any consideration of friendship by the mere asking, of saying, "I'm an orphan. I was left on the steps of a foundling home. I don't know when my birthday is; so I celebrate it every day of the year." Or I simply lie and tell them I was born in September or February. Then I let them run those dumb numbers about how they absolutely knew I was a Pisces or a Leo or whatever because of this trait I manifest or that attitude I display. And then when they're all puffed up like pouter pigeons with their perceptive insight, I knock them in the head with my actual birthdate. Try it sometime. Watch how they back and fill and blame it on *you* that they made an ass of themselves.)

Now you may feel that attacking something as patently ludicrous as astrology is a waste of our time here; but I submit the undercurrent of belief in the irrational that astrology contributes to our society, speaks directly to the scientists' assertion that such things keep us from facing the pragmatic realities of our complex and demanding lives; that in a time of widespread education, of availability to *everyone* of the data that tells us how the world really runs, relying on bugaboos like astrology is one more manifestation of our refusal to deal with the materials at hand, to put our fate in the grip of irrational, non-existent forces.

And in so doing, we become powerless. We tend to feel inferior, helpless, manipulated. And we become pawns. We find ourselves hustled into jobs, lifestyles, relationships, situations we despise, which debase or use us. And as Louis Pasteur said, "Chance favors the prepared mind."

Meaning: there is a lot less roll-of-the-dice in what happens to us than we care to admit. There is a power inside us, having nothing to do with The Force or Zen or God or any of the other names we give to self-determination, that can help us order our lives and rule our own destinies. It is called, surprise surprise, intelligence and reasoning.

PHOTO © 1977 COLUMBIA PICTURES



Close Encounters: space-age religiosity or institutionalized superstition?

Look: I know what you're going through. You're not alone. They're all around you, trying to divert your attention, trying to convince you that you can't make it alone, without their help. If it's not the clowns on the religious television network haranguing you that you aren't decent enough or clever enough to get through life nobly on your own without slavish bondage to an ancient bearded myth, it's some peer-group Mephistopheles telling you ludes or free-basing is just what you need to get your head straight. The lame love to try leading the halt. Misery loves company.

And television and movies—the two most effective handmaidens of institutionalized obeisance to the existing power-structure—don't give you much help. For instance, consider these two items:

(From the AP wire, out of Detroit, dated 16 December 1977): "A Detroit newspaper thought it had an offer few could reject—\$500 if a family agreed to turn off its television set for one month.

"The *Detroit Free Press* approached 120 families with the offer. And 93 turned it down.

"The paper said it was trying to study 'television addiction.'

"Only 27 of the families that were ap-

roached agreed to exchange their TV viewing for the \$500, the paper reported. A typical response came from a Romulus (Mich.) woman, who said: 'My husband would never do it. He comes home from work and sits down in front of the TV. He gets up twice—once to eat and once to go to bed.'

"The newspaper selected five families that agreed to accept money in exchange for television and sent TV repairmen into their homes on Sept. 19 and 20 to disconnect their sets.

"The paper reported these results:

"Two people started chain-smoking—one going from one to 2½ packs a day.

"While some children played together peacefully, others became cranky, bored and begged to have the set turned back on. Most of the fathers said they got to know their children better, men and women alike said they had gone back to reading books for the first time in years, and four families said they were drawn closer by the experience."

Huddling against the terror of ostracism, no doubt.

(From the *Los Angeles Times*, dated 8 January 1978):

"...the movie house has become the

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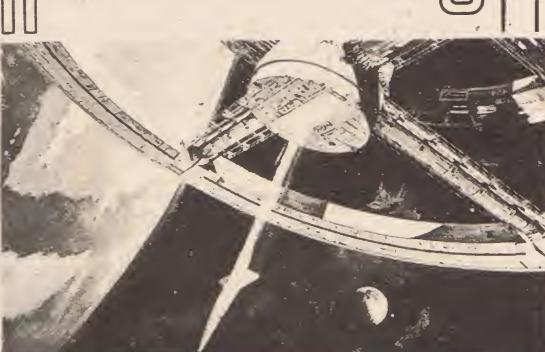
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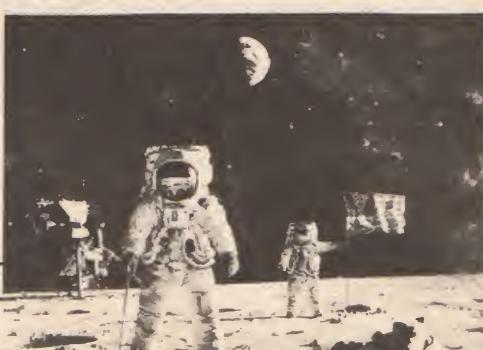
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sacred church' for the pseudoscientific faiths, said Paul Kurtz, head of the Committee for the Scientific Investigation of Claims of the Paranormal.

"The movie *Close Encounters of the Third Kind* strikes Kurtz as 'extremely religious,' involving 'semigods from outer space.' Kurtz believes the entertainment media are abetting 'attacks on rationality' by presenting various speculations as scientifically possible....

"Finding the terms adequately to cover the range of new beliefs is difficult, Kurtz admits, but he lists three categories:

"1: Space-age religions. By-products of actual ventures into space—UFO-ology, astrology revival, Scientology and the genre pioneered by Erich Von Däniken's now-almost-universally-debunked book *Chariots of the Gods*.

"2: Psychic phenomena, the interest in claims of ESP, precognition, prophecies, psychokinesis, levitation, out-of-body experiences, Seth-ism, reincarnation, Edgar Cayce-ism, etc.

"3: Occult faiths, including exorcisms, devil cults; neo-Oriental religions and psychological interest in Eastern wisdom.

"Kurtz (a philosophy professor at the State University of New York in Buffalo and editor of *The Humanist* magazine) said he does not believe that the born-again movement and the pseudoscientific faiths are entirely separate."

And that was in a time prior to Jim Jones and the Guyana slaughter, a time prior to the power-mad decay of Synanon that turned a once-dynamic force for social improvement into a paranoid nightmare, in a time before the sect calling itself The Church was revealed to be a hype providing rake-off to fund a racketball factory in mainland China owned by the son of the founder. All examples of following new Messiahs. Born-again, duped again. There're a million suckers born every year.

Chance favors the prepared mind.

And the world is teeming with sharpers who want your mind as clouded with sillystuff as they can shovel into it, so you can be manipulated more easily. In short, they want you as uneducated as possible.

Which leads me to the two terrific items by Isaac Asimov.

The first is Isaac's entertaining and exhaustive treatise titled *Extraterrestrial Civilizations* (Crown, \$10), which is the

very latest thinking on the possibility that there's *someone out there*. For any but the pimplebrained, this book once and for all should shine all the light one ever needs on that fascinating contemplation. I won't go into any lengthier support and praise of Dr. Asimov's closely-reasoned work, save to suggest you get this one, too, along with the *Astrology Disproved*, as a bulwark against the nuttiness spread by your friends, unscrupulous tricksters, parochial know-nothings and perennial adolescents who want to share their fear of living in the world as we perceive it.

The second item from Isaac goes straight to the heart of how dangerous it is in these times to be ignorant of what's *really* going on, in politics, in the sciences, in cultural and social changes. He wrote it as one of the regular "My Turn" op-ed columns in *Newsweek* (21 January 1980).

Every one of you should read this piece. I'll give you a couple of snippets in a moment, but if you want a Xerox copy of the entire outing, if you send a stamped and self-addressed envelope to me care of FUTURE LIFE, and mark on the outside in *bold print* ASIMOV ESSAY, I'll make sure the editors forward them to me, I'll reproduce them and fire one back to you free. A public service against the Forces of Dumbness.

But just to whet your appetite, and to further promulgate the message of this month's column, here's one paragraph:

"There is a cult of ignorance in the United States, and there always has been. The strain of anti-intellectualism has been a constant thread winding its way through our political and cultural life, nurtured by the false notion that democracy means that 'my ignorance is just as good as your knowledge.' "

It's that old saw that everyone is entitled to his/her opinion. In my own wonderful elitist fashion I've never accepted that for a moment. What I will accept is that everyone is entitled to his/her *informed* opinion.

Chance favors the prepared mind.

Knowledge, education, use of reason, constructive cynicism. Those are what keep us from becoming like the man I saw on the news the other night, the item I mentioned earlier.

We're having horrendous busing problems here in Los Angeles. All those hypocritical lip-service Liberals who condemned the Deep South for its

racism, for keeping the blacks down, for not integrating, are showing themselves to be a solid part of the racist tradition of this country. As long as de po' niggas was over there in Watts and South Central L.A., getting shitty educations (if any at all), everyone out here could be as bold in their speech as they cared to be. But the minute Judge Paul Egley said all them there lily-white urchins had to share schools with darkies... they suddenly went crazy.

And on TV the other night, at a meeting held in one of the San Fernando Valley all-white schools, where a lottery was being held to determine which half of the students would be bused, somebody's father got up, screaming, ran to the podium and threw the baskets of name-slips all over the floor. He was roundly cheered by the rest of the audience, except for the few rational parents who realized in a way that commends their nobility to our attention, that the discomforts and problems of busing are one of the prices we as a nation must bravely pay for hundreds of years of enslavement for a large segment of our people.

That man is a racist.

He doesn't know it.

He can rationalize it any way he chooses—usually on the basis of not wanting to put his kids through any travail—but the core recognition is that he has inherited a racist attitude from the overwhelming weight of American historical practice.

He is uneducated. His mind is unprepared for the tide of history. And he will suffer for it. Worse, he will make his kids suffer, and his community. Multiplied by thousands, he is a living example of the ugliness of the human spirit that prevails when we live with superstition, gossip, myths, corrupt misconceptions about the state of the pragmatic universe.

There's only one danger attendant on such an attitude, of course. And it is that we as a species will drive ourselves right into oblivion.

But then, the cockroaches probably wouldn't invent the equivalent of *The Love Boat*, *Laverne & Shirley* or *The 700 Club*.

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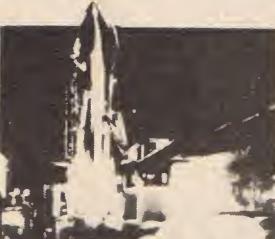
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B/W—Starring: Mikel Conrad, Pat Garrison, Hanz Von Teuffen, Virginia Hewett. A huge saucer, hidden under a glacier, is the subject of search by U.S. and Russian scientists. This was the first film dealing with flying saucers and was reviewed by FBI before they allowed its release.



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B/W—Starring: Forrest Tucker, Janet Monroe, Jennifer Jayne. A chilling SF terror tale of a shimmering alpine fog that contains deadly creatures from another planet. Victims are found decapitated; tremendous tension! Released in England as "The Trollenberg Terror," with music by Stanley Black.



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• GALLERY •

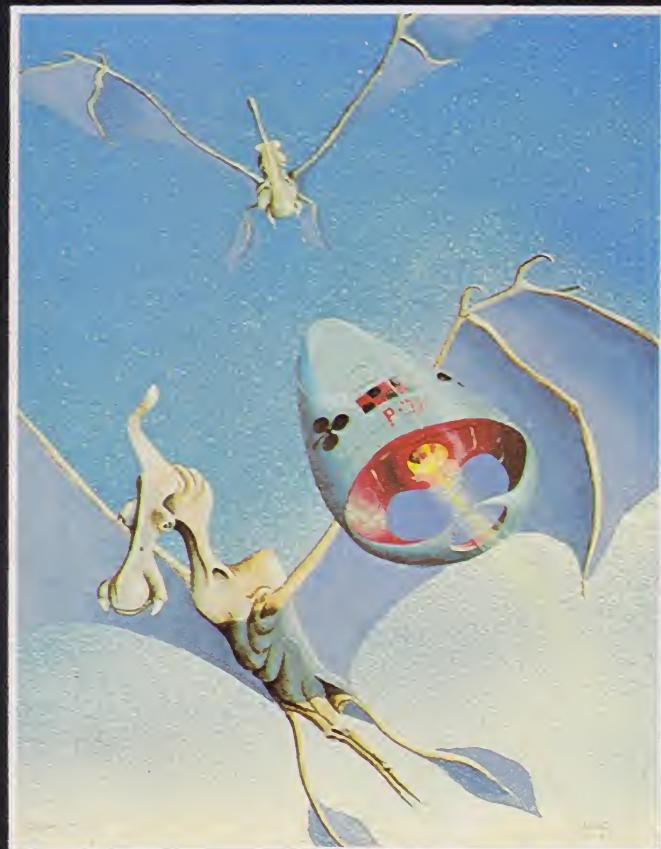
Kevin Ward

"I believe the future is going to be full of people that are other things besides heroes with bulging biceps and women with bulging...." Kevin Ward laughs. "Whatever."

Kevin, a 24-year-old Tennessee artist, has been caught up in the world of science fiction and fantasy for as long as he can remember. "When I was three years old," he explains, "my dad bought me some toy dinosaurs, and ever since then I've been interested in science. That eventually led to science fiction and art."

One of the things out there, says Kevin, may be other worlds inhabited by beings as curious about us as we are in them. In this issue's Gallery centerfold, entitled "In Irdenoben's Breath," two crafts from different worlds meet for the first time. "One is obviously human because it's using human symbols on its side. The other is supposed to be alien. I don't know whether it looks alien or not, but it does have alien lettering.

"The reason I called it 'In Irdenoben's Breath' was because I figured if we go out to other stars we'll find that they are real places, not just some kind of number like Wolf 359, which is the way we name



stars now. I think we're going to have to give them some sort of romantic name.

"The reason it's called Irdenoben's Breath is because we're inside the corona of a red star." He grins. "I'm not sure whether the inside of the corona of a class M star would really look that way or not,

but I needed an excuse to get away from the pitch black of space."

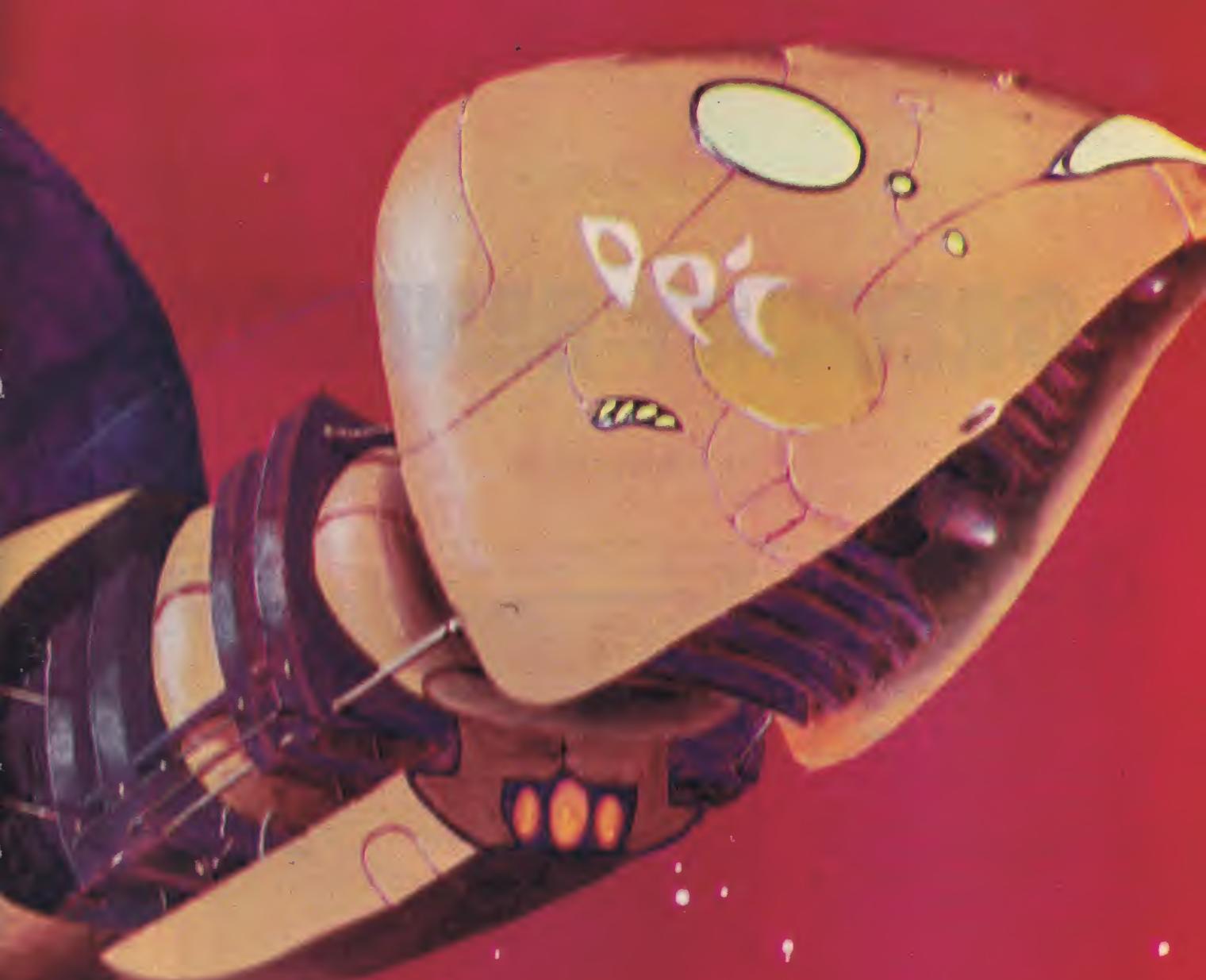
The painting on this page, called "Caution: Skyclutter," is actually a visual joke. "It's kind of a tongue-in-cheek type thing," Ward explains. "I used to work at the airport here in Nashville. One

day I saw a poster on the wall that kind of struck me as funny. It was a poster warning pilots that when they encounter a flock of birds, don't try to dodge them, because the birds are supposedly smarter than the pilots and they can get out of the way better than the pilots can. I thought that was sort of funny, and I just put it in the future tense. What would happen if you were trying to fly in some planet's atmosphere and came across these giant slow-flying creatures? Are they too stupid to get out of your way?"

Kevin, who now holds down a part-time job at Sears, is slowly beginning to become recognized in local science fiction circles, and hopes one day soon to be able to concentrate totally on his art. "I've started doing legitimate space art," he says. "I've never been real interested in the planets of the solar system, because the pictures that we've gotten back have all been pretty fuzzy. But ever since Voyager encountered Jupiter—those pictures were so nice—I've started to get interested in the planets again. I've always let my imagination wander into other solar systems to see what might be out there."

Centerspread: "In Irdenoben's Breath" © 1980 by Kevin Ward





•INTERVIEW•

GREGORY BENFORD

By MICHAEL CASSUTT

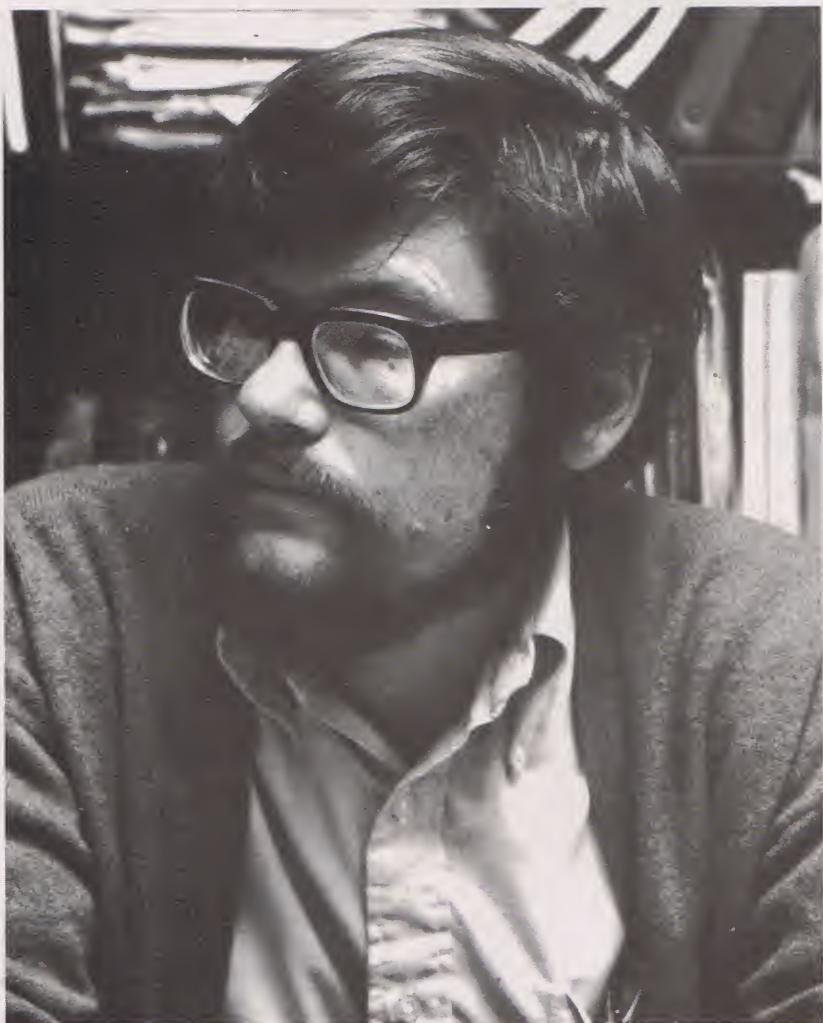
Gregory Benford is a tough guy to interview—not because he's uncooperative (which he's not), but because it's impossible to write a simple lead about what he does. Take your pick:

a) Greg Benford is a full professor of physics at the University of California/Irvine, author of over 60 scientific papers and articles that have appeared in publications like *Astrophysics Journal* and *Encyclopedia Britannica*; winner of numerous fellowships for study abroad in the fields of plasma physics and high-energy astrophysics, with special emphasis on the dynamics of pulsars; a member of the Royal Astronomical Society; a teacher.

b) Greg Benford is an award-winning writer who has published seven novels and almost four dozen shorter works of science fiction since 1965, including "If the Stars Are Gods," *In the Ocean of Night*, and his new major novel, *Time-scape*, which was purchased by Simon and Shuster publishers for "a six-figure advance."

c) Greg Benford is a 39-year-old ex-Army brat and world traveler, a connoisseur of wines and student of Oriental disciplines, a player of "all racquet games," a husband and father of two, a resident of a marvelous house that faces the Pacific Ocean in the hills high above Laguna Beach, California.

The answer, of course, is all of the above.



Can a real-life scientist of physics and astronomy translate his practical knowledge into award-winning science fiction?

Now, there have been other scientists who became science fiction writers in their spare time—Dr. Fred Hoyle, for example, or the late mathematician Eric Temple Bell, who wrote under the pen name “John Taine.” Charles Sheffield is another. There have also been several famous SF writers who gave up careers in science or technical fields to write full-time. Isaac Asimov was a biochemist, for example, and Arthur C. Clarke was the author of a famous paper that led to the development of the communications satellite. But until Greg Benford, no one has been able to excel in science and literature at the same time.

How does he do it? It seems to be a matter of priorities. “I don’t regard my writing as a career,” he says, “though in an economic or formal sense it is. And I have to resist very strong pressures to get me to do more and to make it more of a career. I do not like to write a great deal, although I seem to have done that in the past few years. It won’t happen again.”

For someone who doesn’t really like to write, Benford has been quite productive while still showing an unusually painstaking and perfectionist attitude toward his work. Unhappy with his first novel, which was originally published by Ace Books in 1970 as *Deeper Than the Darkness*, he rewrote it completely for a new edition in 1978, this one titled *The Stars in Shroud*. He recently completed the third version of a juvenile SF novel called *Jupiter Project*, which Berkley

will reprint shortly. His highly acclaimed novel of a man’s first contact with an ancient alien spacecraft, *In the Ocean of Night*, took seven years to write—seven years of evenings and weekends “rap-rap-rapping out words” on an old manual typewriter.

This sort of devotion is unusual in any field, and especially among those SF writers whose training has been scientific rather than literary. But a glance at Benford’s fiction shows that it owes more to contemporary literature than it does to classic SF. He admires John Updike, for example, a writer almost universally scorned by SF people as “too literary.” “I’ve got nearly all of Updike’s hardcovers out there in the hall,” Benford says, gesturing to a bookshelf stacked with hundreds of titles. “I think he’s maybe the most interesting writer currently working. I’ve read more Faulkner in the last six months than anything else. My secret vice is that I have never read, or never been able to read, a large number of the great hallowed works of science fiction. Vast pieces of the landscape, like van Vogt and certainly Burroughs, E. E. Smith and all the great old pulp writers, are unknown to me . . .”

This is vaguely heretical talk from someone who was a prominent science fiction fan as a teenager, and who still confesses that he attends SF conventions “as a fan.” Benford and his twin brother Jim even shared a Hugo nomination for “Best Fan Magazine” in the late

1950s. And he does like certain classic SF writers, notably Heinlein.

But with Benford, science—not science fiction—was always first. “I can remember standing in front of a third or fourth grade class giving a five-minute talk about nuclear physics, and how neutrons and protons united and then you could make them fission if you did this . . . and the teacher was congratulating me on having read this book and given this talk, and I thought I was quite a bright little fellow.”

This bright little fellow tried to sell SF professionally while still a teenager: “Garnered some polite rejection slips, and quit writing because I became too involved with science. In fact, I didn’t write anything again until I was working on my doctorate.” This time he was successful. His first story was published in *The Magazine of Fantasy and Science Fiction* in 1965. He earned the PhD at UC/San Diego in 1967, and Benford has been at UC/Irvine since 1971, with occasional forays into consultant work and fellowships.

What is a day in the life of a young physicist like? “Reading the literature, doing calculations, talking to graduate students, scribbling things on blackboards, looking at experimental results—thinking about them some—and occasionally giving talks to learned societies. For a person like me who is a theoretician, most of it is desk work, sitting and reading and writing, and although I

"It's always bothered me that fiction doesn't show people at work unless they're bank robbers or starship captains."

started as an experimentalist, I don't do many experiments any more.

"A lot of the work involves politics—the politics of how you get grants, how you get an idea and make it enough of your own so that you become identified with it. You do the usual trip; go places and give seminars so as to have your name associated with the idea, claim your turf. There's a lot of that in science.

"Actually, it's partly to answer such questions—what do scientists do?—that I wrote *Timescape*, because much of *Timescape* is about work. It's always bothered me that fiction doesn't usually show people at work unless they happen to be bank robbers or starship captains." And Dr. Benford's current work, his turf? "I work now, primarily, in the areas of plasma turbulence and astrophysics. I've been working specifically on quasars, on the theory of radiation for pulsars and on the dynamics of these very mysterious objects, the so-called extended radio sources, which are really jets of relativistic particles that are

shot out of galaxies and typically have a million times the volume of a galaxy. They're the largest things in the universe, and the question is: What the hell are they? Why are there so many of them?"

Benford's involvement with the mysteries of higher physics is rarely translated directly into his fiction, but here *Timescape* is an exception. The novel, he says, "tries to point out something that is not known to many people, namely that the physical idea of time is completely different from the idea of time that we live with. We see things going on in a straight, linear fashion, and we believe that time runs forward in a sense that is immutable. That's why the time travel story is thought by many to be a complete fantasy, because you can't go back and change the past.

"The problem is that physical laws, in their current formulation, don't seem to know this. And yet they work. They can predict the outcomes of experiments, but if you change Time (T) to negative-Time (-T) and you make all the particles run backwards, the system still works perfectly. The question of *how* it is that the world seems, to us, to run forward, while the laws of physics allow it to run both forward *and* backward, is a fundamental question that has not been answered." Take this central idea, add Benford's interest in people and their work, season with stylistic grace and mix. The first reviews of *Timescape* have been overwhelmingly favorable, and the book has drawn positive comments from authors such as Brian Aldiss, Norman Spinrad and Anthony Burgess.

Benford's best-known work explores the impact of contact with alien cultures and artifacts on the human psyche. That interest, too, comes from his experiences. "I've spent a lot of time living outside this country. My father was an Army officer and I lived for three years in Europe, three years in Japan... I like different cultures, different points of view. Sometimes American society can be a bit stifling. It is, after all, a big planet out there, and a science fiction writer who never goes outside his own study is going to miss a lot." There's no danger of that happening to Benford. Just last year he traveled to Italy, England, France and Holland.

When this highly organized man does retire to his glass-walled study to write, he tries to challenge himself. "Succinct-

ly, what I like least about SF is that all too often it's tennis with the net down. It either completely finesse the scientific constraints on a story, or fails to treat the characters or scene realistically. Instead—to pick an author who has great virtues and great faults—it's like the background in a Philip K. Dick novel: it's just pasted on. Now, I know that often Dick is not trying to write a 'realistic' novel, but sometimes he is. Nonetheless, his backgrounds are still the same papier-mache with paint on them. That happens a lot in SF.

"I do like Tom Disch's recent book, *On Wings of Song*, I like John Varley's short stories and I always find something of interest in the standard 'hardcore' SF writers like Poul Anderson, Larry Niven... Charles Sheffield is an interesting writer."

Benford's upcoming projects include a second collaborative novel with Gordon Eklund (with whom he wrote *If the Stars Are Gods*) called *Find the Changeling*, which Dell will publish this fall. *Shiva Descending*, a deep-space disaster novel written with William Rotsler, was published by Avon last spring. And he is committed to the writing of a pair of sequels to *In the Ocean of Night*. These books are likely to keep him busy for several years, especially considering his resolve to spend more time traveling and "taking my kids to the beach."

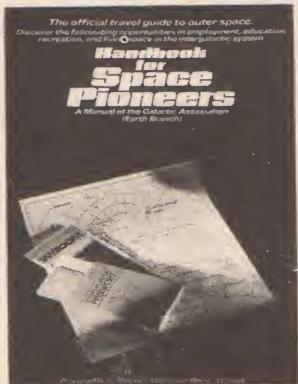
Greg Benford is obviously not some cold thinking machine in human form. He lives in the real world—in fact, because of his training and work, he's probably more aware of what goes on than most of us are. "Science can give you a completely new vision of the world. We've had several in the past centuries. Once Darwin and Wallace publish, once you realize that the world isn't just 500,000 years old, you can't think about it in the same way again.

"The nice thing about being a scientist is that you really get to try out new ideas under the very strong constraints of everything else you already know. But scientists aren't used to looking forward and seeing the implications of these ideas when they hit the main body of the public. So you play both sides of the street. Science fiction gives you the chance to reintegrate your feelings and ideas about the world."

So, what does Greg Benford do? Science and science fiction—

In the proper order.

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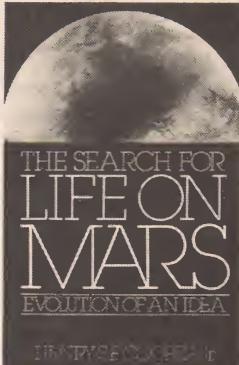
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Martians and Other Aliens

Is There Life on Mars?

On July 20, 1976, Viking 1 touched down on Mars. Most people thought that one of the oldest and most tantalizing mysteries of science was finally about to be solved; that we were about to learn if there was life somewhere other than here on Spaceship Earth. Well, most of the results are in and the lab boys can only give us a resounding "maybe not" on the question of whether there's life on Mars.

In **The Search for Life on Mars** (\$10.95 in hardcover from Holt, Rinehart and Winston) Henry S. F. Cooper recounts the bewildering struggle to unravel the mysteries of the red planet.



popularizer "the greatest menace since the black plague" and a man who's "... brilliant and sometimes right."

Don't get the wrong idea from these quotes. Despite their acerbic comments, both his scientific fellows and NASA administrators appreciate the support—both financial and psychological—that Sagan's well-televised enthusiasm for things extraterrestrial has garnered from the public and (more importantly) the increasingly penurious Congress.

In fact, one gentleman thinks that the only problem with Carl is an excess of imagination. And though that may disconcert a few of his colleagues, that excess of imagination played a part in getting the mission to Mars off the ground. "Hell," says one scientist, "you think they'd pay a billion dollars to investigate the geology of Mars?" With that in mind, team members stoically (sometimes) put up with requests from Sagan for things like a flashlight attachment for the lander so they wouldn't miss any of Mars' nocturnal fauna.

That may sound a bit far-fetched, but in his role as intellectual gadfly Sagan was important to the mission. He challenged the sometimes too-conventional wisdom of his fellows, keeping them all on their toes. And he argued the case for life on Mars persuasively enough that, at a final pre-launch press conference, 11 of 17 Viking scientists indicated that yes they did believe that there was life on Mars.

The book's second section is about two \$55 million 12-inch cubes—the biology section of the Viking landers; the men who designed them and the team that tried to interpret the data they sent back from Mars.

The two Viking landers each carried three biological experiments. Vance Oyama's fed a rich nutrient broth (called chicken soup around JPL) into a soil sample, then looked for gases that would indicate that something was munching on his offering. Gilbert Levin's experiment consisted of a somewhat leaner mix of liquids complete with radioactively labeled carbon. He wanted to feed, then find the hungry organisms. Norman Horowitz—the team pessimist—who thought that the other two were going to drown any Martians they found with the respective stews, was bathing his soil sample with a mix of radioactively labeled carbon dioxide, putting it under a sun lamp and looking to see who used the gas to grow. He hoped to find a little Martian flora.

All three gentlemen got more surprises than results. On the first experimental cycle, they all got what looked like strong positive results, but since nobody wants to be wrong about as big a question as whether or not there's life on another planet, they waited for the second cycle. There, new problems emerged. The team found itself going from guarded optimism to absolute pessimism to outright confusion. And the landing of Viking 2 brought new data that was no less ambiguous.

So what's the answer? Is Mars a dead planet? The earthbound lab boys say probably, but the optimists (Sagan among them) argue that there's still a lot of territory that needs checking out.

Mr. Cooper just reports this convoluted mystery the best he can. And

coming from the author of *A House In Space* and *Apollo On The Moon*, that's very well indeed. This book does an excellent job of making an incredibly complex situation understandable even for those of us who don't like the scientist's conclusions. And it offers a compelling contrast between the sober scientific teams and the unbridled imagination and wonder of speculator Sagan. The question is, when it comes to ETs, which is the better approach?

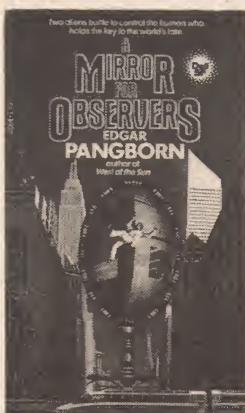
Extraterrestrial Tourists

A quarter of a century ago, Edgar Pangborn came to the same conclusions Carl Sagan has—that once there was life on Mars. Sagan thinks the microscopic Martian survivors are hibernating somewhere beneath the surface waiting (like MacArthur) for a good time to return. Pangborn's notion was that they simply moved off the planet. His book, **A Mirror For Observers** (\$1.95 in paperback), tells a quiet, beautiful tale of aliens among us.

The Observers of the title moved to Earth when Mars could no longer support them. There are only a few thousand of them here and the Observers have no plans for conquering humanity.

They're just waiting for us to grow up enough to accept them. There is one tiny faction of the invaders, though, who see us as no more than cattle. These are the Abdicators and they want Earth for their own.

This is the story of the battle between these two factions. It's not your usual SF fracas complete with lots of bombs and bombast. Instead, Pangborn offers a very small fight over a 12-year-old boy's mind and future. Angelo Pontevecchio is a focal point in the development of the human race and as he goes, goes the future of all of us. The weapons the Martians use here are truth and delusion. Benedict Miles is Angelo's Observer and his



wonder at the imagination and vigor of the human he meets can make you look around your neighborhood with a new vision.

This marvelous and contemplative tale won the short-lived International Fantasy Award when it came out in 1954, which puts it in stellar company. Other winners were Ted Sturgeon's *More Than Human*, Clifford Simak's *City* and Tolkien's *Lord Of The Rings*, to name a few. Sadly, Pangborn's book has been out of print for a while; happily, it's back and probably won't go away again.

The Best of . . .

Every year, SF readers are tempted by literally dozens of short story collections purporting to be the very best of this author, that year or some other collectible category. There are very few collections that can truthfully state that *every* story's a winner. One of these is the annual collection of Nebula Award winners, and **Nebula Winners Fourteen** (\$11.95 in hardcover from Harper & Row) is the latest volume of this top-flight series.

The Nebula Awards are given each year by the Science Fiction Writers of America after polling the members, endless earnest discussions and no little acrimonious debate. Sometimes the Nebulas are won by the same writers or stories that the fans bless with Hugos, but just about as often the two awards have no one and nothing in common. Of course, you may not think that these are the absolute best of 1978, but you have to admit that every one of these stories is something quite special.

Editor Fred Pohl opens the collection

with John Varley's exquisite "The Persistence Of Vision," one of the best SF novellas of this or any other year. There's very little more that can be said about this story.

It won the Nebula, the Hugo, was in two of the three Best of the Year collections for 1978, was the title story of Varley's first collec-

tion and seems well on its way to being one of the most collected stories in the genre's history. So, I'll just say that it's beautiful and if you haven't read it you should.

The short story award went to Edward Bryant's "Stone." Now, the mean (usual) SF reader is young, male and middle-class or, in other words, the same kind of folk who buys all those rock-and-roll records—but SF keeps ignoring such modern music. Well, Bryant has a story to remedy that. "Stone" gives us the ultimate concert in a stark hot story that turns the volume all the way up.

Every year the editor has considerable leeway in what he (or she) puts in the collection. This year Mr. Pohl has plugged in two essays on the history of the genre. Isaac Asimov contributes "Science Fiction: 1938" which tells the happy tale of the genre's hardy pioneer stock. Norman Spinrad provides us with a cautionary tale in "The Future Of Science Fiction." Spinrad is confident enough to predict that the boom of the '70s can only get bigger, but he cautions that SF writers are going to have to be good to be successful in his future—*persistence ain't gonna be good enough*.

The collection also contains Charles L. Grant's "A Glow Of Candles, A Unicorn's Eye" which won the novelette prize, and an excerpt from Vonda McIntyre's Hugo and Nebula award-winning novel *Dreamsnake*. And just to cover his bets, Mr. Pohl has tossed in the runners-up in the short story and novella categories—C.J. Cherryh's "Cassandra" (Hugo winner) and Gene Wolf's "Seven American Nights" (simply wonderful) respectively.

This is an impressive volume and if you pass by collections (there are a lot of folks who do on principle) you should break your rule for this one.

The Alsorans

The only thing SF readers like to do more than pass awards is argue about who should have won. Richard Lupoff, author and editor, has had the audacity to collect the stories that he thinks should have won the Hugo SF Achievement Award. Volume one of a series of argument starters entitled **What If?** (\$2.50 in paperback from Pocket) has just arrived and it contains his should-have-beens for 1952-1958.

The Hugos are fan awards given at the annual World Science Fiction convention. A Hugo is a symbol of success and guarantees better sales to boot. Now Mr. Lupoff doesn't

go so far as to say that the fans have bestowed their largesse foolishly—he just thinks that some spectacularly innovative, positively brilliant stories have been overlooked in years past and is determined to

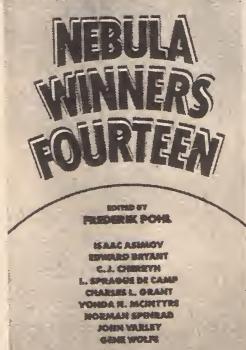
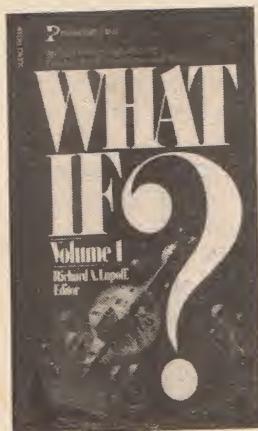
right three decades of award-giving injustices.

Alfred Bester won the first Hugo for his classic *The Demolished Man*. Lupoff has no argument with this, but *The Demolished Man* is a novel and Lupoff can't understand how the convention could ignore all the great short fiction of that year. This was 1952 and Heinlein's "The Year Of The Jackpot" had just come out along with Ray Bradbury's "The Smile," Isaac Asimov's "The Martian Way" and William Tenn's prize story (according to Lupoff) "Firewater." "Firewater" is a twisted tale of aliens among us that will astonish anyone who missed this mostly-retired master's work. Suffice it to say that aliens land, the scientists can't cope and a businessman saves the world. It's a darkly funny story that will bedazzle, bewilder and befuddle the reader by turns.

There wasn't a prize for 1953 so Lupoff has a clear field. In fact, he even has Phil Dick to second his nomination of Damon Knight's "Four in One" as the best story of 1953, and a fine one it is.

Theodore Sturgeon's "The Golden Helix" gets the nod for 1954. Now this story hasn't been as sadly overlooked as some in this collection, but it was overlooked in 1954. Wonder what they were thinking about? Lupoff simply thinks it was a conspiracy, and on reading one of Sturgeon's best, you may agree that it would take a conspiracy to beat this story.

You should have the idea by now. Lupoff has looked back and found some of SF's neglected marvels. Shirley Jack-



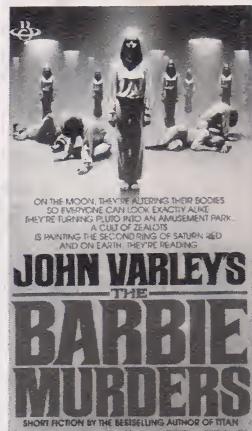
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son's "One Ordinary Day, with Peanuts" is nominated for '55, Poul Anderson's "The Man Who Came Early" is offered for '56, Kate Wilhelm's "The Mile-Long Spaceship" for '57 and "Two Dooms" by Cyril Kornbluth closes out '58 and the collection. These are all classics that have been buried by lesser works.

Mr. Lupoff has done us a favor by digging out these stories and if you want to argue about his irreverence, fine; me, I just like reading good stories and these are all that and more. Maybe the real arguments won't start until Lupoff gets his alternate prizewinner collections a little closer to the present.

A New Winner

As long as we're talking about winners, hot new talent John Varley has just shown up with a new collection—**The Barbie Murders** (\$2.25 in paperback from Berkley)—showcasing his latest little packages of wit and wonder.



This young gentleman doesn't seem capable of a serious misstep. He just keeps popping out stories other writers would kill for.

The entire collection takes place in Varley's Eight Worlds scenario where humanity has been banished from Earth in favor of the dolphins and whales. The collection begins with a bomb speaking to the multitudes saying, "I am a bomb... I will explode in four hours, five minutes and 17 seconds... I have a force equal to 50,000 tons of trinitrotoluene," in a story titled "Bagatelle." Varley then proceeds to a murder in an enclave where everybody looks *exactly* alike ("The Barbie Murders") and finishes with a meditative tale on sex (the changing of) and death that hints at a rebellious return to Earth by these exiles.

And that's just three of the book's nine stories. Mr. Varley plays with materials his contemporaries can't even find, uses a deceptively light touch of blackest humor and has been accused

(by Dr. Asimov no less) of being as good as the young Mr. Heinlein. If Mr. Varley keeps on moving, that description might be considered selling him short. This is a genuine talent at work and you owe it to yourself to keep an eye on him.

Whodunits

I have to confess that I love mysteries and lately (to my delight) SF writers seem to be putting together mysteries out there in the future. The latest pandering to my taste is Dennis R. Caro's novelistic premiere **The Man in the Darksuit** (\$1.95 in paperback from Pocket).

This futuristic mystery has some very neat aspects. The detective, one Bo Coggins, is an ex-athlete (a high diver to dry ground) who does the dirty work for a government superstar secret agent. Bo's problem is that he rescued a chubby young heiress by the name of Muffy Bernstein and now she wants him to rescue her company.

The book is quite entertaining since Mr. Caro has some little talent for cynical hard-boiled dialogue, but the book is very much lacking in mystery. You meet the villain on page one and if you haven't figured out who he is by the end of chapter two then you don't read mysteries very often.

Caro doesn't stint on complications. It's just that the complications don't have anything to do with the mystery. They only give Caro an opportunity to pull out some gadgets for his hero or trot out some snappy dialogue.

So—if you want to blow an hour or so, this book can be fun. But if you want to be mystified and led into dark corners to see what evil lurks, then maybe you should return to the Chandler.



"Oh dear. Something's gone terribly wrong!"

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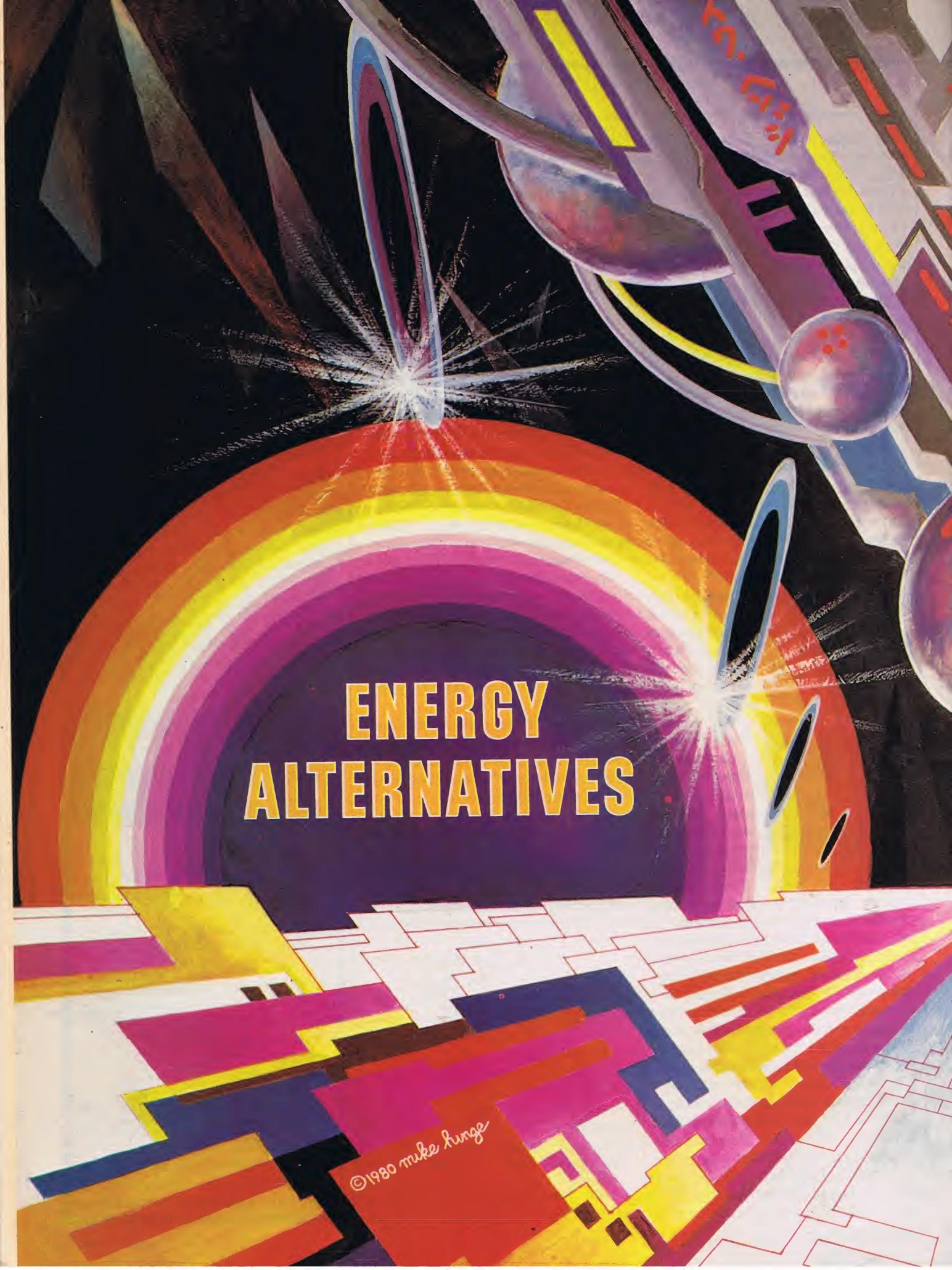
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ENERGY ALTERNATIVES

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Today the United States is engaged in one of the biggest treasure hunts in history—the search for energy. While recently we have depended largely on fossil fuels and nuclear fission, these are no longer considered adequate to satisfy the voracious energy hunger of our nation.

The following two articles deal with alternative sources of power. One of these sources emanates from the far reaches of space, the other from within Earth itself—but both are innovative means to the same end.

SYNFUELS

THE UNDERGROUND ENERGY MOVEMENT

Alternative sources—coal, oil shale, tar, sands—offer the promise of supplying tomorrow's fuels. Or do they?

By BOB WOODS

In June 1980, President Carter signed into existence the Synthetics Fuel Corporation, thus beginning what is hoped will be a program to help alleviate the United States' energy crisis. Waving the same banner that three years previously had declared our energy woes as the "moral equivalent of war," the Carter Administration now claims a major victory. With the world gradually—but undeniably—running out of conventional fossil fuels, while concurrently demanding more and more energy, establishment of the SFC sets forth the optimistic goal of providing two million barrels of "synfuels" annually by the year 1992. With a staggering ten-year budget of \$88 billion and a supertanker-full of problems to overcome, the SFC is embarking on an uncharted course. A successful journey could reap untold energy treasures, but the storms enroute—economic, technological, political and environmental—promise to test the mettle of a wide-eyed crew.

Oil shortages have been predicted before: in 1920, in the late '30s and again following World War II. But this time, the experts agree, the images in the crystal ball are clear. Known reserves of oil have peaked, while exploration and extraction of new sources lag sorely behind. However, the U.S. contains

other promising resources that could fill the gap. Rich deposits of coal, shale oil and tar sands—the primary targets of the SFC troops—represent an unprecedented potential for enough energy to power America for up to another two centuries. The important question now is whether it's already too late. Would it be wiser to invest some of those billions into decentralized schemes such as solar, geothermal or wind? The synfuels gamble has been taken. It remains to be seen if this high-stakes gamble, employing the best and the brightest from both private and government levels, can provide for our future energy demands.

The term synthetic fuels—or synfuels—relates to a number of alternative sources: gas and liquid fuels produced from coal; oil extracted from shale rock deposits; fuels produced from the fermentation of organic matter, generally referred to as biomass; and burning wood to create energy. For our purposes here we will discuss only coal, shale oil and tar sands; these are the three areas outlined by the Synthetics Fuel Corp.

Actually, the use of synfuels is nothing new; it is mostly the technology that has changed. Before the arrival of electricity in the late 1800s, most of the streetlights in this country were lit by gas derived from coal. In fact, such gaseous fuels were in use right up to the time when transcontinental natural gas pipe-

lines offered a cheaper alternative. Shale oil was used as a substitute for more expensive whale oil to light home lamps before the introduction of kerosene in the 19th century. More recently, Germany, under the Hitler regime, produced 90 percent of its aviation fuel and 68 percent of its regular fuels from coal sources. Indeed, at the height of World War II, the Third Reich had an output of 2.9 million barrels of synfuels per month (fuel made at plants which became prime targets for Allied bombers). Germany's reliance on synthetic fuels was not for economic purposes, though; the country lacked sufficient petroleum reserves.

As increasingly large oil and natural gas deposits were found, and processing and transportation became cheaper, synfuel production lost its footing. When discoveries of huge oil supplies were made in the Middle East during the last couple of decades, the world took on the attitude that the flow of oil would never cease. It really wasn't that long ago that Americans were paying less than 30 cents for a gallon of gasoline. But those days are gone forever. Gas prices are inching their way to the \$2 mark; two debilitating shortages have occurred in the last decade; domestic supplies are drying up; and OPEC is dominating an extremely volatile oil market. There is today a general belief that the time for synfuel production is now or never.

The greatest component in the synfuels scenario is coal—and for good reasons. It is estimated that the United States is sitting on top of at least 27 percent of the world's known coal reserves, making the country a veritable coal

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OPEC. Though projections of actual reserves are in dispute, the U.S. Geological Survey estimates that we have at least 1.7 trillion known tons, along with another 1.8 trillion tons still unmapped or undiscovered. At any rate, there's enough coal for another 100 years or more.

As the projections of the demise of oil continue, coal's attractiveness has come to the forefront. In his National Energy Plan of three years ago, Jimmy Carter called for a greatly increased turn to coal over the coming years. Synfuel from coal was part of his scheme, as was the conversion from oil- to coal-burning power plants and the construction of new coal-fired plants.

The coming of coal was anticipated in the private sector long before the present situation. Back in the late '60s, the major oil companies started buying up coal companies, acquired reserves and essentially rearranged the coal industry. For instance, in 1966, Continental Oil pur-

chased the Consolidation Coal Company, then the second largest coal producer in the U.S. Similar acquisitions were made by Exxon, Standard Oil, Ashland and Occidental Petroleum.

Aside from the magnitude of the actual amounts of coal in the country, there was another important incentive: Though coal's use has been limited, the industry itself has flourished. From mining operations to transportation to labor organization to the actual combustion, the coal industry is a modern, productive, established operation. Compared to other areas such as nuclear and solar, promising though relatively unknown commodities, coal is simply a good investment.

In 1977 a Texaco administrator openly admitted that his company had acquired coal reserves in the '60s due to the promise of the synthetic fuels research and development. Other companies followed suit, while both private business

and government agencies continued optimistic R&D. The optimism waned, though, with the rise of inflation in the early '70s and discouraging estimates of the high costs of synthesizing coal into gas and oil. Then the Middle East erupted; two massive shortages in 1974 and 1979 resulted in enormous price hikes. The situation in the Mideast in general and within OPEC specifically grew more unstable by the day, finally coming to a head in late '79 with the overthrow of the shah of Iran and the more recent war between Iran and Iraq. The politics of oil have created a ripple effect felt in every corner of the world.

All of this has dramatically changed the attitude toward synfuels. Not only is there the question of economics and dwindling resources; now national security has become a real factor. In response, finding new fuel sources has been promoted to top-priority status. This created a panic of sorts in Congress



PHOTO: FRANK HOFFMANN/DEPT OF ENERGY

PHOTO: JACK SCHNEIDER/DEPT OF ENERGY

Coal gasification plant. Synthetic natural gas is already competitively priced. Inset: Shale oil products.

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and a heated debate on how to approach synfuels began, culminating in the adoption of the Synthetics Fuel Corp.

So how exactly do they make synthetic fuels? The basic technologies to produce gasoline and other petroleum products from coal have been around since 1913, when Germany's Friedrich Bergius discovered a way to make oil from coal, a process known as direct coal liquification. Today there are three methods of liquification, but each involves the combining of powdered coal with a solvent and treating it with hydrogen at high temperatures and moderately high pressures. Coal can also be indirectly liquified by gasifying it first and then transforming the gas into a liquid. The indirect process, while producing less liquid than the direct process, yields a greater variety of products, one of the most important being gasoline.

The Lurgi method of gasifying coal, also developed by the Germans in the 1930s, combines the mineral with steam and oxygen to form methane, carbon dioxide and hydrogen into what is called intermediate Btu gas or IBG. Another method produces a high-Btu synthetic natural gas (SNG) that is indistinguishable from natural gas and can be combined with it—at a competitive price.

Oil sands, often referred to as tar sands, have been in use for centuries. Only since the 1960s, though, have they been considered as a major fuel source. Most of the material is sand, each grain coated with a thin layer of hydrocarbon called bitumen; about 14 percent of the deposits are oil. Tracts of tar sands have been found in Canada, Utah, Venezuela, Africa, Europe and the Soviet Union. The bitumen is recovered by mining the sand and then mixing it with hot water, leaving a filmy substance that is thinned with naphtha and then upgraded to produce synthetic oil.

Oil shale is found throughout the world, locked into various geologic forms. In the western United States, a dense rock called marlstone contains an oil known as kerogen. To extract the oil, the shale is mined, pulverized and heat-treated, turning the kerogen into a vapor and separating it from the rock. The remaining liquid is then upgraded and refined by conventional processes.

Generally speaking, the liquification processes are still quite expensive and might not be competitive with conventional fossil fuels for several years. On

the other hand, the price of gasification is closer to that of producing natural gas and is being seriously considered for immediate application. In fact, the world's first commercial-scale gasification plant, which will turn coal into gas at a rate of 125 million cubic feet per day by 1985, is now operating in North Dakota, and others have been planned for the U.S., Poland and Germany.

Which brings us back to the government-sponsored Synthetics Fuel Corp. and its \$88 billion. The primary goal of SFC is to help develop synfuels that could reduce U.S. dependence on foreign oil. The funds can be used in a variety of ways, but all of them are designed to lower the risk of synfuel ventures and entice private industry to do the job. The corporation will make direct loans and loan guarantees, guarantee prices for some new fuels and contract to buy fixed amounts from others. The SFC is also empowered to fund as many as three government-owned projects. A two-phase blueprint has been drawn up: \$20 billion has been earmarked for the next four years, and the remaining \$68 billion will be allotted for phase two, whose design will be determined after the completion of the initial phase.

At the time of this writing, President Carter has nominated Deputy Energy Secretary John C. Sawhill to head the SFC, and has decided on six others to serve as the corporation's board of directors. However, Congress failed to approve the nominations before their fall recess, leaving the program in a political limbo. In response, the President made what is called a recess appointment of Sawhill and four of the six directors.

According to a spokesman for the Carter Administration, it will likely be sometime in spring of 1981 before the SFC shifts into action. A staff of 300 still has to be hired, and then the monumental task of appropriating \$20 billion will be tackled. Meanwhile Congress, eager to let its constituents know that they are doing something about the energy crisis (especially in an election year), wants to get the synfuels movement off the ground. Therefore, it has directed the Department of Energy to distribute \$5 billion until the SFC gears up. So far, \$1.5 billion has been granted for the North Dakota coal gasification plant. Another likely candidate is the

Defense Department, which wants to develop shale oil for use in military vehicles and aviation applications. In another show of eagerness, the W.R. Grace Company has been guaranteed \$12 million, despite criticism by the Administration for not abiding by suggested wage and price controls. The Texas Eastern Company has been given a \$24-million start-up loan to build a coal liquification plant, which they hope will be in production within six years.

Similar and related projects have been initiated by a number of other private firms including Exxon, Texaco, Gulf Oil and the FMC Corp. Most are for the establishment of pilot plants that, if proven successful, will usher in commercial operations within the next decade.

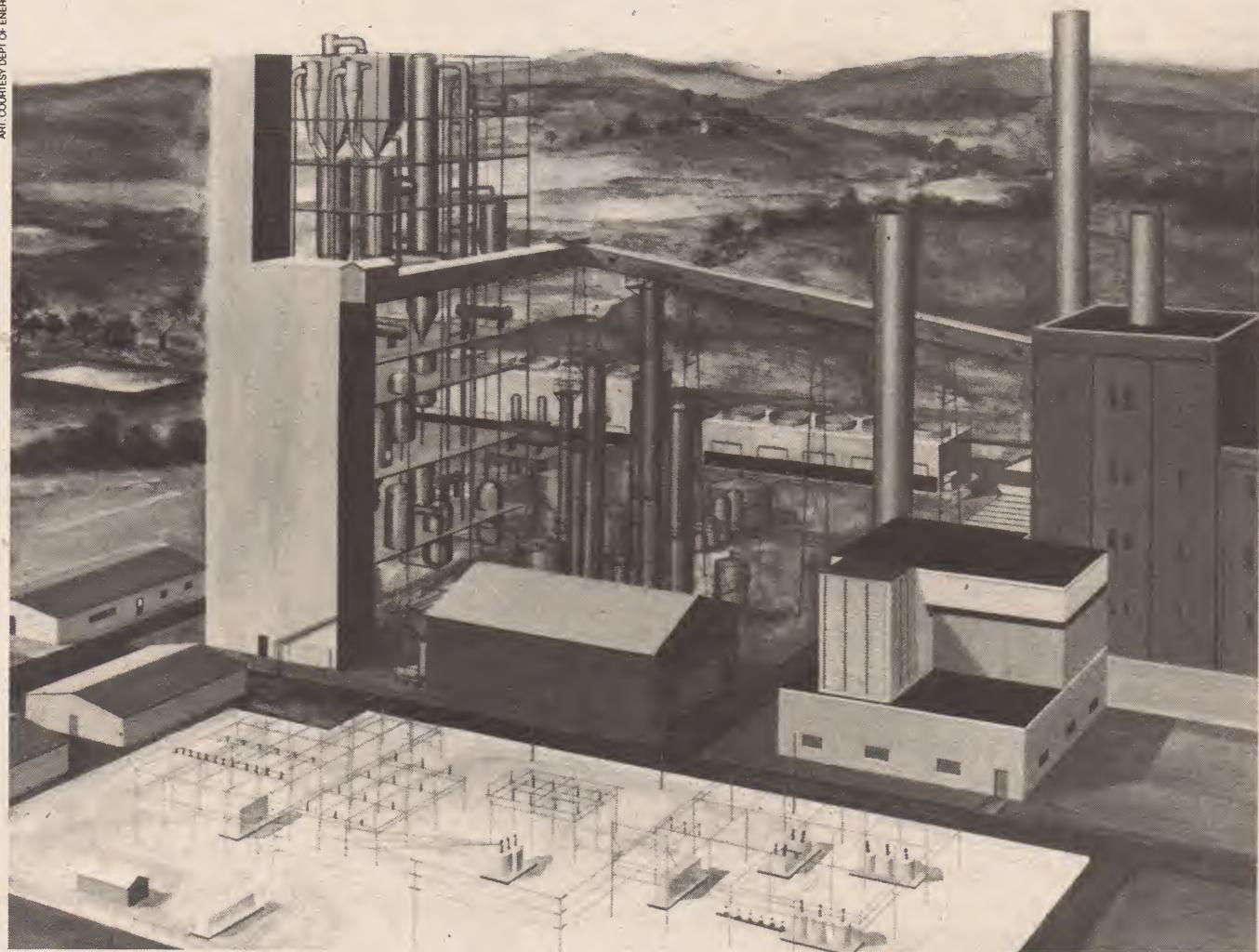
For all the bright promises of the synfuels movement, there are cautions being voiced. Some critics are crying political foul, seeing Carter's overwhelming enthusiasm masked behind the November elections. Fiscally-minded opponents come from both ends: Some argue that \$88 billion is too much; others say it's too little. (A report by the Rand Corp. states that the program could easily cost twice the \$88-billion price tag.) Pessimists wonder if the plan might not be too little too late, leaving a gaping hole as far as our immediate needs are concerned and neglecting other potential alternatives.

At the top of the skeptics' list are environmentalists, who see an immediate danger in the increased use of coal. Fearing that the long-sought-after clean air laws may go up in sooty smoke, battlelines have been drawn. The Department of Energy suggests that potential problems such as the "greenhouse effect" will be overcome by impending technology, but a recent study prepared for DOE suggests carbon dioxide could start making a noticeable impact on world climate by the year 2035 at the current rate of conventional fuel consumption. A massive shift to synfuels, though, says one of the report's authors, could bring about climatic mutations by the end of this century.

In his testimony on the behalf of John Sawhill's nomination as the SFC head, Sierra Club's Washington representative Jonathan Gibson stated that the programs and policies of the

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ART: COURTESY DEPT OF ENERGY



Artist's concept of coal gasification plant being built in Sioux Falls, S.D., with funds from government and industry.

corporation "will have a sweeping effect, for better or for worse, on the energy future of our country and the environment....". Gibson went on to caution against a blind nosedive into synfuels that could find "the costs of ... production in terms of human health effects, environmental and social degradation, diminished wildlife and recreation value of our public lands and investments required... (in excess) of the energy benefits."

William Gibbs, past president of the American Society of Civil Engineers, a group instrumental in the planning of the corporation, echoes Gibson's concern. Gibbs warns that although he is glad that the synfuels program is getting off the ground, it should not be viewed as a panacea for our energy ills. More specifically, he is not so much worried about the processes as he is with the promises. Gibbs would like to see a

more immediate role for conventional fossil fuels, solar power and nuclear generation.

Two years ago, Ben C. Ball of MIT pointed out the dangers of the technological revolution inherent in the synfuels push. Contrasting synfuel development to that during the emergence of the oil industry, Ball emphasized that the technological demands will be traumatic. Whereas the growth of the oil industry was an evolutionary one, he said, synfuels projects are dependent upon an entirely new raw material supply that in today's inflationary climate could prove disastrous if something goes wrong. "The failure of a single synfuel plant," Ball estimated, "would be equivalent in size to the bankruptcy of the 100th largest corporation."

Last year Exxon, a major developer and investor in Synfuels R&D, pub-

lished an article in the company magazine *The Lamp* that, in part, spoke of the program in simple, human terms. "Careful planning and financial assistance will be required to develop—almost from the ground up—the housing, roads, schools, hospitals and other facilities that will be needed." Calling on joint efforts involving the private sector and government at the local, state and federal levels, the article concluded that the "challenge is how to plan new communities and develop the energy resources... without spoiling the land, water, sky and lifestyle..." of our nation.

There is no doubt that synfuels will play a major role in this country's energy picture. There also seems to be a consensus that the road to synfuels is bound to be a bumpy, unmapped one with dangers at every turn. Nevertheless, there is no turning back. □

SOLARES CORBEZ

REFLECTING POWER FROM THE SUN

*I*t does look quite unnatural. A sensory shock totally unexpected in the tranquil desert night. There, just a few kilometers beyond the crest of the access road, looking like a special effect straight out of Close Encounters of the Third Kind, lies the glinting light "dome" of the Solares ground station. A network of such stations fulfills most of Planet Earth's energy needs. They also provide a visual spectacular of orbiting mirrors, twinkling against the starry desert night, reflecting sunlight to the waiting "solar farms" here on the ground. The farms are enveloped by an eerie luminescent dome of dust-scattered low-level light. Against the blackness of the night sky, the effect is shocking, even unnatural. Unnatural? Perhaps, but regardless of its optical effects, Solares is welcome. Soon all of our energy needs will be met by Solares, and days of oil spills, strip mining, smog and nuclear waste will be gone, dispatched into history by a quick, clean beam of light.

This future scenario describes Solares (Space Orbiting Light Augmentation Reflector Energy System), a system of orbiting mirrors designed to reflect sunlight continuously to ground stations for conversion to electricity or other uses.

By STAN KENT

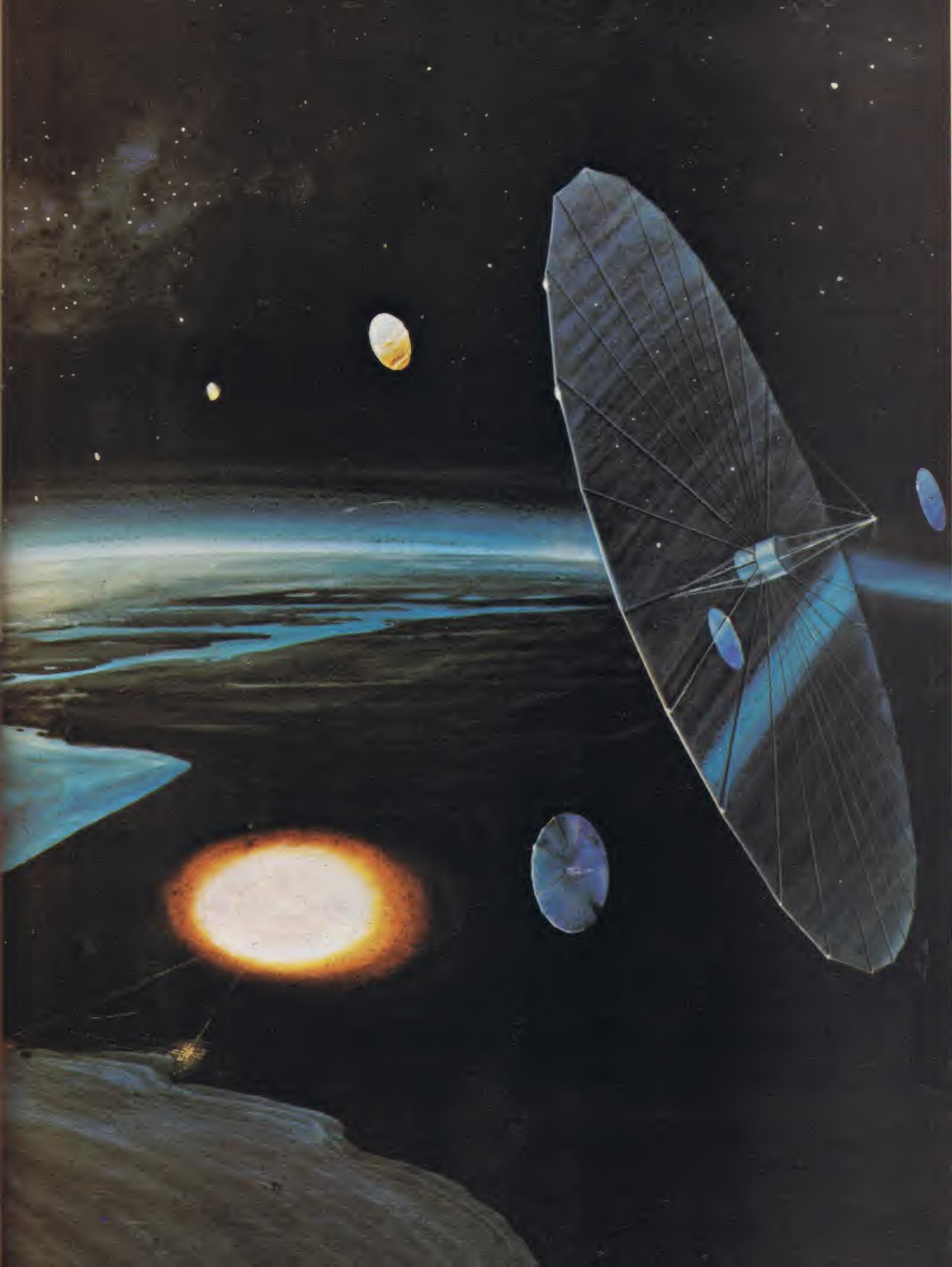
This concept is not new. In 1929, the legendary German rocket pioneer Hermann Oberth proposed that a sodium metal mirror be orbited and used to reflect sunlight to the ground for solar heating. More recently another German space pioneer, Dr. Kraft Ehricke, proposed a much more elaborate scheme of orbiting mirrors which he called "lunettas" and "solettes." A lunetta mirror would reflect light to the ground at the intensity of moonlight, whereas the larger soletta mirror would provide sun-like illumination. Both the lunettas and the solettes could be used for all manner of tasks from street lighting to search and rescue illumination, and eventually climate control.

The last few years have seen the orbiting mirror concept come several significant steps closer towards an operational system. These advances have largely been due to the efforts of two NASA scientists, Ken Billman and William Gilbreath, and a consulting engineer,

Giant mirrors in geosynchronous orbit will send light from the sun towards an energy-hungry Earth. The mirrors will be made of a thin, reflective material.

Stuart Bowen. The three researchers have studied possible orbits, mirror construction, system costs and Solares' potential impact upon the precarious world energy situation. The studies, conducted at NASA's Ames Research Center in Mountain View, California, point toward the promise of Solares, but before Solares can be hailed as the solution to the world energy problem, the researchers suggest much more in-depth studies be performed.

Perhaps the most obvious question facing Solares researchers is exactly which orbit to put the mirrors in. Orbital position determines ground receiver size, mirror size for a given desired illumination, number of mirrors orbited and therefore system costs. Many of the pre-NASA studies of orbiting mirrors suggested placing the reflector in geostationary orbit because the reflector would remain fixed with respect to the receiving ground station, thereby eliminating the need for more than one orbiting mirror and ground station. But the attractiveness of geostationary mirrors ends there. Geometrical optics dictates that if we desire to reflect an amount of sunlight equal to that received at high noon in the desert, the geostationary mirror would need to have an area equal to 200,000



ENERGY ALTERNATIVES

square kilometers, and the ground receiver would need to cover 87,000 square kilometers (roughly the same size as the state of Maine!). The costs of such a system would be, to say the least, astronomical. When the material, transportation, land and labor force costs are estimated, the total system capital investment is of the order of \$4,500 billion.

But if the costs are large, so too are the returns. The geostationary Solares mirror would produce an amount of energy equal to two-and-a-half times the *world* energy consumption in 1977. However, researchers agree that, given the financial restraints of today, a smaller system constitutes a much more practical approach.

Once the specifications of the orbit are known, and a ground illumination equal to high-noon desert values is as-

sumed (about 1 - 1.4 kilowatt per square meter), the total required orbiting mirror and ground station areas can be estimated. Unlike the geostationary case where astrodynamics dictates a single receiver and mirror of huge dimensions, the lower orbits would permit multiple receivers and mirrors.

In the baseline case, the 45,800 square kilometers of orbiting mirror area needed could be achieved by a large number of small mirrors, or, alternatively, a small number of large mirrors. The choice of mirror size is constrained by mirror construction techniques, and our ability to transport and construct large space structures. The final choice, as with the determination of optimum orbit, will depend upon the size of the system, cost restrictions and a host of other issues.

One of those other issues is the size of

the space transportation system. A Heavy Lift Launch Vehicle (HLLV) of the kind researched by Solar Power Satellite (SPS) protagonists is needed. A HLLV would be a true space freighter, being completely reusable and capable of delivering 400 tons of payload into low Earth orbit at a cost of \$10 per kilogram. For the sake of comparison, the space shuttle can deliver 30 tons of payload into low Earth orbit for a cost of \$1,000 per kilogram.

The final choice of a space transportation system will be greatly influenced by mirror design and construction. There are many possible improvements in the area of thin film space structures that could substantially reduce the mass of the reflector. Recently, John Hedgepeth of Astro Research Corp. in Santa Barbara, California, evolved a space mirror design which could be folded and

Once the Solares mirrors are in orbit, they will reflect sunlight to ground stations around the world.



ENERGY ALTERNATIVES

launched in a single space shuttle launch. The mirror would have a diameter of one kilometer, and in mass terms it would be lighter than the Solares baseline mirror. Obviously, further research in this area will make Solares even more of an attractive energy alternative, and an ongoing program to develop thin film technology will be funded by NASA, although Solares itself will not receive any funds.

Further space transportation costs could be reduced by the technique of solar sailing the mirrors to their final orbital position. Solar sailing uses the pressure of solar radiation, as it is absorbed or reflected by the mirror surface, to propel and steer the reflector in a similar manner to the well-tried uses of terrestrial winds and sails. Once refined, the solar sailing technique can also be used for station-keeping of the satellite, thereby eliminating the need for continual replenishment of thruster fuel. Station-keeping is required because many forces will perturb such large structures. Even though we think of space as a vacuum, air drag is still an important consideration when large structures are placed in low Earth orbit. As a measure of the magnitude of this effect, the baseline Solares mirror would quickly spiral to a fiery (and costly) destruction in the Earth's atmosphere if station-keeping thrust were not provided.

If the importance of air drag needs to be emphasized further, Skylab—an 85-ton space structure—experienced a rather untimely and embarrassing reentry, all because of an unexpected (or at least NASA says it was unexpected) increase in air drag at Skylab's orbital altitude of 300 kilometers.

The Solares baseline mirrors would be nowhere as dense as Skylab. Each mirror would weigh between 4,000 to 7,000 kilograms and have the density of newsprint paper. The structure would resemble a bicycle wheel in appearance with thin aluminum-coated polymeric film stretched over the "spokes." The supporting structure of the reflector would be a graphite-epoxy thin-walled arrangement capable of maintaining the required film tension. The complete mirror arrangement would be "freeflying," that is, it would not require servicing by maintenance crews over its expected 30-year lifetime. As previously mentioned, solar-sailing will eliminate the need for on-board fuel requirements for

station keeping, but control forces will be required to point the mirror at the correct angle to the sun. These turning forces can be supplied by energy storage wheels initially spun by the HLLV, and continuously replenished by electricity from solar cell panels. The momentum wheels exert torques upon the mirror structure, causing it to turn to the correct angle, as determined by the onboard computer, required for ground illumination:

Once at the correct angle to the sun, the mirror reflects sunlight to the ground station as it passes over the station. The ground station uses well-tried solar energy collection techniques that are presently in limited use. The receiver would be horizontal (a tilted receiver is more efficient, but involves a more complex supporting structure; therefore, greater costs occur), and a variety of conversion and storage techniques will compliment the basic solar cell receiver. It is important to realize that as long as the sun is shining, the ground receivers would produce energy regardless of whether a mirror is in orbit. Once a Solares mirror network is in operation, the ground receiver can be used for almost 24 hours a day, thereby eliminating the traditional objection to ground-based solar energy—what happens when the sun goes down?

The other traditional objection to terrestrial solar conversion is: What happens when clouds block out the sun? Again, Solares provides an answer. Because the Solares mirrors would be reflecting almost continuous noon-time desert sunlight to the receivers, the temperature of the air above the receiver would be warmed to desert-like conditions. Natural convection, like that occurring over several tropical islands, prevents cloud obscuration. Experts indicate that this phenomena illustrates the weather modification potential of Solares, but again, considerable research is needed in this area.

Besides the potential for overt climate control, a Solares system could be used to remedy the harsh effects of a severe climate. For example, a snow-bound city could use properly reflected sunlight to melt the snow and ice in a controlled manner. Another application of the Solares system would be in underdeveloped nations where the primary need is not necessarily for electricity for industrial processes, but energy for agrarian

demands. The Solares system could extend the growing time of crops, desalinate sea water, pump water for irrigation and provide energy input for biomass conversion.

These examples are spin-offs from a system whose major purpose would be to provide energy for the ever-increasing energy appetite of the industrial nations. Conservation could reduce energy consumption, but barring a return to a pre-industrial revolution society, there will still be a huge demand for energy. Either we use our traditional sources until they are depleted to the point of unusability, or we invest in long term solutions to the energy conversion crisis. Solares represents one possible long term solution.

With such promise, it is criminal not to investigate the Solares concept at the same level as the aerospace industry's other energy option: Solar Power Satellites (SPS). The largest objections to an SPS system are environmental. Whether founded or not, there are substantial concerns about the beaming of microwaves through the atmosphere. All of the concerns will not be listed here, because Solares bypasses all of those objections. Beaming noontime desert sunlight to the ground is not going to cook anything, although the thermal effects upon the environment need to be studied. If this proves to be a problem, special mirrors called dichroic mirrors could be used as the orbiting reflectors. Dichroic mirrors reflect only that portion of sunlight which is most efficiently converted into energy by the ground-based solar farm, and the other portions which tend to create waste heat are allowed to travel off into space. Additionally, Solares does not require the orbiting of as much mass as does SPS, therefore less rocket launches, and less holes punched in the ozone; a concern voiced in recent SPS congressional hearings.

The point of this comparison is not to write off SPS as an energy alternative. Compared to coal, nuclear and oil, SPS comes out ahead on an overall basis. But if we fund SPS studies to the tune of \$8 million per year, so should we fund Solares at a compatible level. There are indications that this will occur, but the road to funding is paved with bureaucrats. Let us overlook this nuisance, and peer into the future, to the day when Solares is operational, and our energy problems are where they belong: in the history books.

Towing Icebergs: A Bold Tale

Once upon a time there was a prince, a very wealthy prince. This well-heeled prince lived in a very dry country, where less than four inches of rain fell each year. And his country needed more water. So this rich monarch had his work cut out for him when he was asked to come up with a scheme to beat these water woes.

At about the same time there was also, many miles away in Antarctica, an iceberg—a very big iceberg. One day someone told the prince of an idea to tow this giant iceberg to his arid nation and melt it down, thus solving the prince's dilemma. The prince was captivated by the notion and asked wisemen from around the world to help him figure out how to perform this incredible feat. So, sit back and let me tell you the real-life tale of what they all came up with....

Back in the early 1950s, the late John Isaacs of the Scripps Institution of Oceanography in California suggested that delivering iceberg water to southern California was a possibility. It was not until 1969, though, that some serious scientific activity began. W.F. Weeks and W.J. Campbell proposed that it might be a better idea to bring the iceberg to arid sites in the southern hemisphere, possibly Australia. In 1973 researchers at the Rand Corp. returned to the idea of iceberg water for California.

Then the prince came on the scene—Prince Mohammed Al Faisal Al Saud of Saudi Arabia. The iceberg concept came to his attention through Paul-Emile Victor, a French expert on polar regions. Prince Faisal had been trying all sorts of ways to alleviate his nation's water shortage, which was growing daily with the modernization of the oil-rich area. He was forced to consider every possibility—desalination, weather modification, importing water—and now icebergs. He invested several million dollars, set up Iceberg Transport International in Paris and held three scientific symposiums, two in 1977 and another last April, to determine if such a plan was a real possibility. It is, but some tricky problems—economic and technological—need to be ironed out first.

First of all, you've got to have an iceberg, most of which are in either Greenland or Antarctica. Glaciologists (those who study icebergs and glaciers) agree that the Antarctic variety, huge

slabs 200 to 250 meters thick, would work better than the less uniform bergs floating off Greenland. Add to this the fact that the icebergs make up an annual water potential equal to five times the world's current use of water.

The most harvestable icebergs are those that break away from the pack ice and drift north. Satellite monitors would follow them, sonar detectors would determine the density of the bergs and the most stable would be chosen for towing.

Now you have to deal with towing a behemoth estimated to have a resistance in the neighborhood of 1,000 tons at a speed of one knot (one nautical mile—6,080.27 feet—per hour). At present, the most a conventional tugboat can pull is less than 200 tons, and so the idea of building super-tugs has been suggested. Other methods of actually moving the berg have also been postulated. One group designed a 50-foot propeller; Prince Faisal and a colleague are redesigning the feathering paddlewheel; another group favors the idea of pulling against fixed points on the ocean floor; someone even suggested hoisting a sail on the iceberg.

Okay, now you have a navigable iceberg and a way to move it. But then there are the fierce waters of the polar region to contend with, as well as the resistance, or drag, of the berg. The ocean current is said to create up to a knot of resistance; a super-tug might produce, at the most, two knots of power. Theoretically, you could end up pulling (or pushing) a berg at full power and not budge an inch. Dr. Arnold Gordon, an oceanographer at the Lamont-Doherty Observatory and a professor at Columbia University, is an expert on polar seas, and he has a solution.

"Going around Antarctica is a circumpolar current with an average velocity of about half a knot. Superimposed on that current are a lot of eddies [additional currents swirling about in various directions]. If you know where they are, you can get a strong assist. These eddies have a velocity of up to a knot, so if you catch them just right, and if you catch them going north, they get you out of the strong currents in the polar region." It's sort of like catching a good tailwind, or like a surfer catching a good wave.

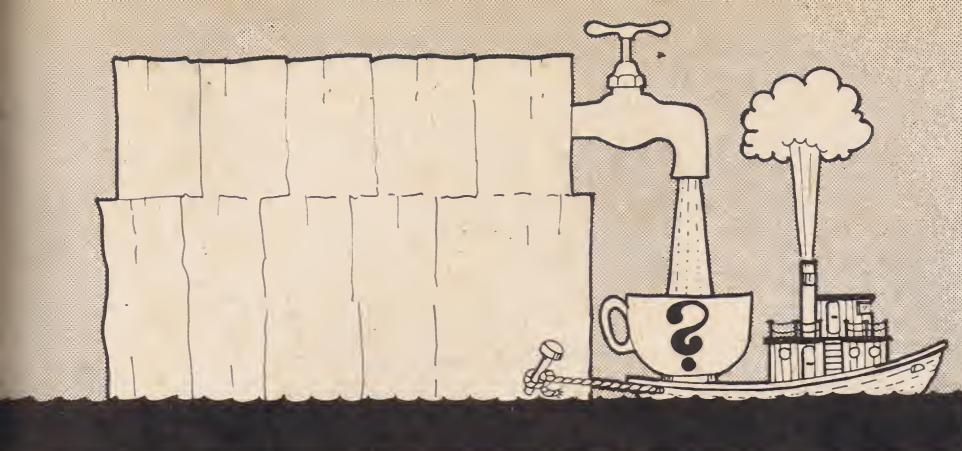
Now you have an iceberg moving north at about two knots. Many students of the idea agree that no matter where you take the berg, it's going to have to be protected against melting and/or breaking apart. Looking at the route from Antarctica to Saudi Arabia presents a little problem known as the equator—it's hot up there! Figures indicate that the journey would take 128 days, while the iceberg would melt within 104 days—sorry, Prince! The only other government interested in iceberg water is Australia, and this is the most likely site for the first tow. Australia is desperately dry in many areas and would benefit tremendously from the fresh water. More importantly, towing an unprotected berg to Australia would take between two and three months, with 50 percent of the ice remaining intact—still a great deal of water.

No matter where the iceberg goes, the least amount of meltage, of course, is desirable. Many theories have been offered. Some people favor the use of an insulating fabric to hold in the cold; others think a layer of foamed insulation would do the trick; or maybe plastic film or wrap. The problem is truly a formidable one, but most feel that it can be overcome.

In order to keep the berg from breaking apart at sea, a method of encircling it with a line or net system is anticipated. This would provide some protection from the severity of the ocean swells and the dangers of the berg breaking apart from meltage.

So what do you do with an iceberg once it's arrived safely in Australia? Considering the portion of the ice that's submerged, the notion of "beaching" it is out of the question. Instead, some method of splitting the berg up offshore is the most likely solution. Various means have been offered: cut it, core it, blast it, saw it, crush it, slurry it. As yet, no overall analysis of the problem has been made—another area the technologists will have to overcome.

And let us not forget the water itself. Just how good is the H₂O, most of which is centuries old? Well, it's about the purest water on Earth. Over the decades it has formed from falling snow, snow completely free of any contaminants. Though some forms of pollution are beginning to appear in Antarctica, it would



not affect any but the first few millimeters of ice. Lamont-Doherty's Dr. Gordon recalls a trip to the area that offers an unusual scenario: "You scoop up some of the iceberg alongside the ship," he says with a mischievous laugh, "and use them to make martinis—with 1,000-year-old water!"

About the most serious environmental detriment the entire iceberg scheme poses is encountered while the berg is moored offshore. It would definitely have potential effects on the local weather, mainly by cooling the surrounding air and water, creating fog and condensation and possibly affecting local aquatic life. The idea of encapsulating the iceberg to capture the melt-water has been proposed.

That's about it, from the theoretical point of view at least. But will it honestly work? Do scientists really believe in this far-out plan? Yes they do. And so does Prince Faisal, even though his dry nation may never get its own berg.

In November, the prince and ITI sponsored a meeting in Paris among those who have been studying this and related topics. Dr. Gordon is one of those experts. He's taking a wait-and-see attitude, feeling that from a scientific standpoint this could be very beneficial. Says Dr. Gordon, "If I could see some scientific merit, I would get involved. Maybe not all the problems have been solved yet—melting and breakup—but it is possible to tow an iceberg to Australia."

Glaciologist Malcolm Mellor at the Cold Regions Research and Engineering Laboratory in Hanover, N.H., has done some part-time work with Prince Faisal and ITI. His specialty concerns the towing problems and the overall economics of the plan. At this time, Mellor feels that the idea is well worth studying, but he too wants to see what comes of the Paris meeting. "It's a bold idea," he admits, "worth looking at because of the potential consequences. We've done all the calculations. What's left is to decide if it's worth going further and spending a much larger figure."

It's now up to the experts—geophysicists, oceanographers, engineers, economists, businesspeople—to figure out the finer points, but the idea seems to be a good one. As for our friend the Prince and his remaining problem of getting some water to his thirsty countrymen? He's still supporting the effort even though the push is to get an iceberg to Australia, not Saudi Arabia. But considering the interest he has generated so far, maybe his persistence will someday come up with a solution. □

BACK ISSUES



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#2—Spaceship Modelmaking; Blood Makeup; Smoke Generator; Light Beam Effects; Making an SF Logo.



#5—Aerial Image Optical Printer; Usage; Widescreen Super-8; Slit Scan Effects; Gleaming Eyes for Stop-Motion Models.



#3—Robot Construction; Developing an Animation Style; Fluid Art Animation; Electronic Special Effects;



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#7—Basic Cartoon Animation; Claymation; Kaleidoscope Effects; Profile: Santostefano

• PORTFOLIO •



John Allison

He's been a commercial artist, a composer and performer of electronic music and now an artist for TV's *Cosmos*.

By ROBIN SNELSON

Although he won't turn 30 until April 13, 1981, Canadian-born artist John Allison has already launched several careers. He has been a comic book writer and illustrator, a commercial advertising artist and a cab driver. He has illustrated stories for Canadian skin magazines, and created electronic soundscapes for radio documentaries. He composes and performs electronic music and works on non-commercial paintings that belong to the school of Magic Realism. Most recently he plunged into the world of TV special effects in his capacity as a supervising artist for Carl Sagan's PBS series *Cosmos* (he also contributed sound effects for the programs).

That may sound like enough for a lifetime, but John Allison figures he has a few more career incarnations ahead. There's a film he wants to make, a record in the works...and he's still painting. The living room of the Santa Monica apartment he shares with fellow artist and *Cosmos* collaborator Adolf Schaller is crowded with electronic keyboards and tape decks. Upstairs in his studio a magical painting of silvery clouds in the night sky over the beach rests on an easel.

John emigrated to the Los Angeles area about two years ago, at the behest of Jon Lomberg, the Toronto artist who organized the crew of artists to work on *Cosmos'* space effects. The task of getting accurate representations of a trip from the edge of the universe on the television screen proved to be a big one, and John rose to the challenge, emerging as a leader and earning the title of supervising artist. In the process—months of seven-day work weeks with very long days—John discovered a real affinity for working with the highly sophisticated technology behind modern special effects. He thinks his experience in recording studios and with synthesizers had a lot to do with how quickly he grasped the mechanics of filming space effects.

"When I first got here, I knew nothing and I was working with the guys who did *Star Wars*," he recalls with a shy smile. "But you know, a microprocessor that will run a sequencer is the same idea as a microprocessor that will pick bits to tell a stepper motor to move so many increments per frame on a motion control camera. And when you lay down multiple track recording, you're laying down first a base line and then a lead line, and then adding other lines. On film you can do the same thing with painting. You can lay down one image doing this and another image doing that, all one frame at a time, programming different speeds. I think that's why I understood it so relatively simply. It's all the same technology."

Maybe it seems simple to him, but the quality and originality of the special effects sequences for *Cosmos* are astonishing, particularly in view of the fact that they were accomplished on a budget that looks like peanuts when compared to the price tag on SF feature film effects,

Right: "Man Who Walked Home"—the art of Magic Realism.



©1976 JOHN ALLEN

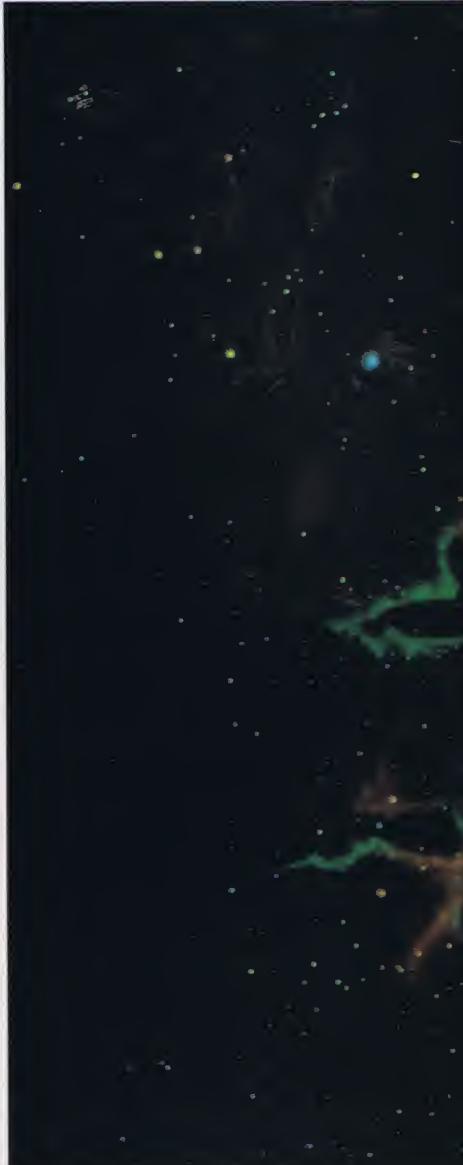
Artist Allison has shown his talents in a number of areas of art, as witnessed from this colorful sampling. Clockwise from right: Allison "does" Folon for a business conference; "Freud Slept Here," done for an art directors' show on erotic art; a supernova for Sagan's *Cosmos*, the series for which he and Adolf Schaller are the artists; Allison "does" Roger Dean for a Canadian advertising firm.

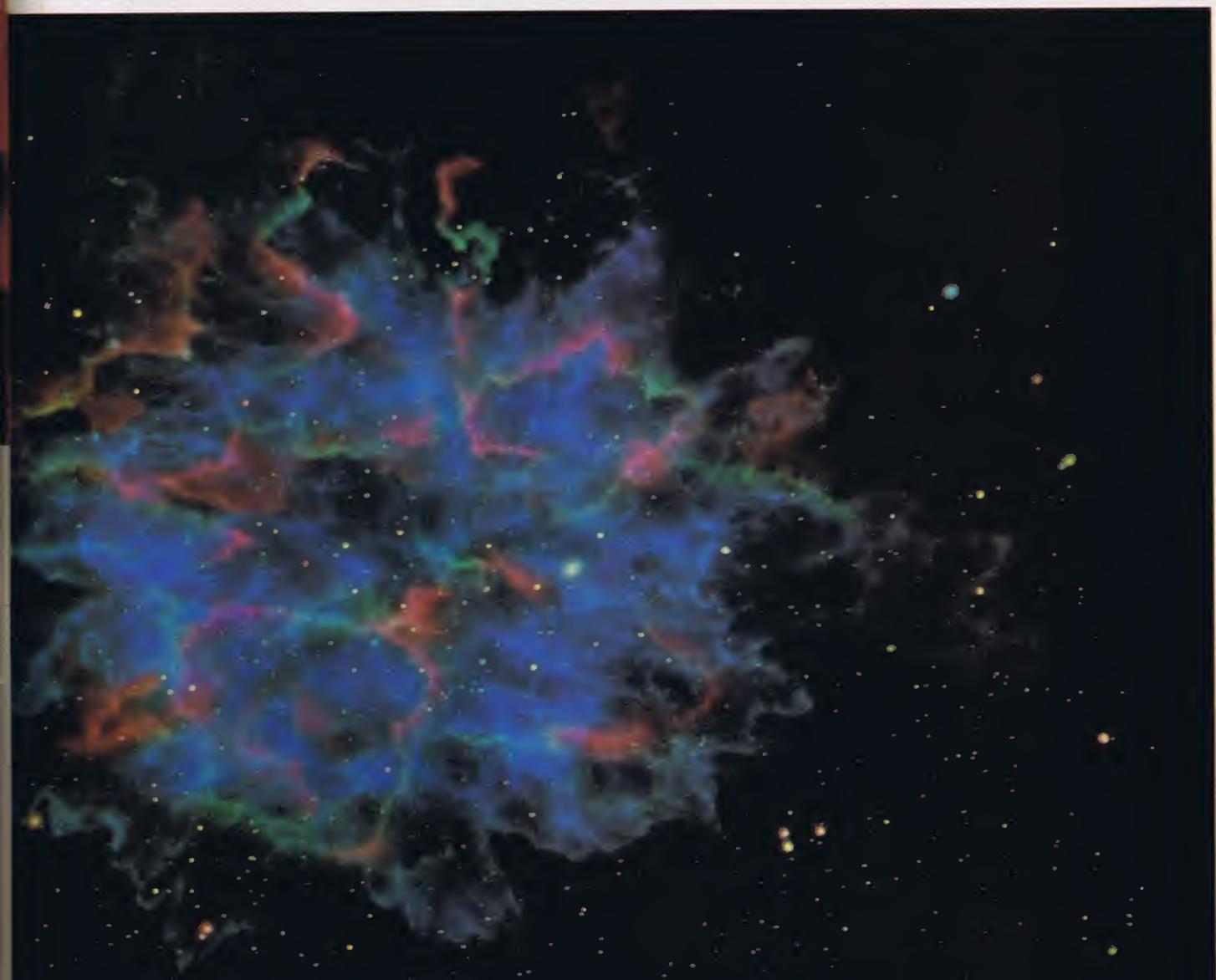


many of which look like they were stamped out by the same computer cookie-cutter.

John regards his crash apprenticeship on *Cosmos* as an excellent introduction to future film work. He now feels confident about embarking on a pet project—re-cutting Fritz Lang's silent classic *Metropolis* to give it modern pacing, and scoring it with his own compositions. (The project lacks only a small-time producer to provide financial backing.) "Before I came here, I didn't know anything about film. Now I know how to do it. I can go into an optical house and get what I want. I had to do all that for *Cosmos*. It just happened that way. It was fantastic experience. And I think it could only have happened on that show, because of the way the producer, Adrian Malone, worked us. He worked us real hard."

His experience working with advertising agencies back in Toronto helped prepare John for the high-pressure deadlines he faced on *Cosmos*. "The ad







**John Allison: "I don't know what your dream is,
but if you have a dream to be something and then
it's no good, what do you do?"**

agencies would play tricks on you," he laughs. "They'd come in the night before and say, 'We'll give you lots of money, but you have to stay up all night and have it in by nine.' And you'd do it, because you'd be afraid they wouldn't pay you!"

He found himself doing advertising art after forsaking an unsatisfying career as a comic artist. "My childhood dream was realized when I got to be a comic artist. That's what I said when I was a little kid, that's all I ever wanted to be was a comic artist. I went to art college, then went to work for Marvel Comics. I worked out of Toronto, and wrote my own stories... but I didn't like it. I don't know what your dream is, but if you have a dream to be something and then it's no good, what do you do?"

What he did was to buy a Synthi—an English-made synthesizer contained in a case no larger than might house a portable electric typewriter. He started playing music. The ad agency where he worked allowed him to use their 24-track recording studio at night. Soon he was commissioned to do spacey sounds for Canadian Broadcasting Company radio documentaries; sounds that painted aural pictures of exploding supernovas and tectonic plate movement and other equally esoteric events. "For dinosaurs, I screamed and ran it backwards," he grins.

While he was enjoying his musical experiments, the advertising artwork began to pall. "In Canada, what they want you to do is make paintings that look like famous guys in the U.S. and Europe. That's what I had to do for a

long time; do Folon, do Roger Dean. Maybe it's good experience, but I don't think it's good for you as an artist in the long run. It'll give you an inferiority complex."

The editorial illustrations he did for Canadian men's magazines proved more interesting. "That was good because they were real loose. They would just give me a story and I could do what I liked."

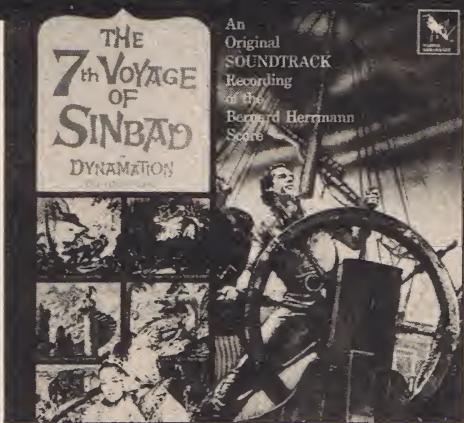
Still, when he was contacted to work on *Cosmos*, John eagerly packed up his Synthi and climbed on a plane to Los Angeles. Now that his work on *Cosmos* is finished, he doesn't plan to return to Toronto. While it's hard to imagine the soft-spoken Canadian in the midst of Hollywood's high-rollers, his unique approach to the business of film effects will likely ensure his success. "I want people to commission me and pay a proper rate for the work I do. The money these guys get out here is astronomical. It's pretty disgusting. I don't want to do that. I just want a fair price and a good reputation for getting the job done right."

Last fall, John was producing special effects sequences for television commercials and beginning to see the first signs of interest resulting from his work on *Cosmos*. Offers were coming his way; he wasn't signing on for any long-term engagements. His music continues to evolve, and he's getting it on tape in a 24-track studio. And there's that unfinished painting upstairs on the easel...

John Allison is a talent to watch. You'll have to keep your eyes and ears open in a variety of artistic fields, but be on the lookout for him. ■

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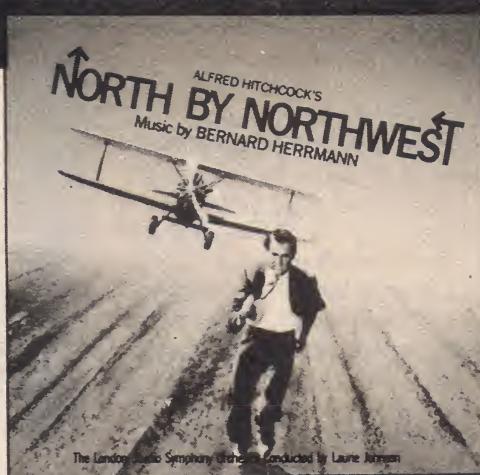
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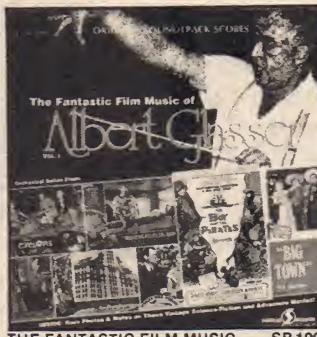
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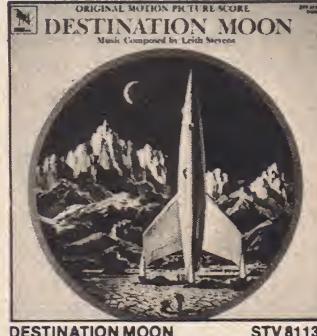
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Cryonics

(continued from page 25)

freeze bodies to preserve them for future revival is not much more than an elaborate scheme for taking advantage of bereaved relatives. In March 1980, the board filed two complaints against Trans Time with the Alameda County District Attorney, and the charges were dismissed as groundless. More recently, Gill asked the California attorney general's office to look into the questions of whether Trans Time was entitled to receive anatomical donations, and whether it should be considered a cemetery. Quaife says emphatically that his organization is quite entitled to receive donations, and is certainly not a cemetery. He has also expressed optimism concerning the attorney general's decision. "Just because there's one rotten apple in cryonics, not all other groups conduct their business in the same way," he says.

"First of all, say you're a member of BACS. You are a member of a non-profit organization, all of whose directors are also suspension members; that is, they've made arrangements for their own suspensions. They have the same



Some of the defunct cryonics groups would wrap their patients in aluminum foil.

vital interest as you in seeing that, if it is necessary to place someone in suspension, that the procedure is carried out properly and that they are maintained in suspension. Secondly, they will have at their disposal the funds to do so. Without those funds, the best intentions won't count for anything."

So where does that leave those of us who want to live forever? Actually, it leaves us in much the same situation as anyone who wants to contract for an expensive and essentially uncertain service. On the one hand, nothing is guaranteed by any of the cryonics societies. If the society remains in operation, and if they properly maintain their facilities, and if

a cure for your disease is discovered and if there is any way to re-animate someone who, as far as today's doctors are concerned, is irrevocably dead... then perhaps some of us may actually live again. On the other hand, if any or all of these *ifs* do not come to pass, some of us may be subjecting our relatives to financial and emotional hardships.

What is the answer? Simple—research, investigate, talk carefully to the people involved and, if necessary, to consumer groups—and then make up your own mind.

And maybe, just maybe, that mind may still be around several hundred years from now. F

From "Close Encounters of the Third Kind" THE MOTHERSHIP Model Paperweight

Now, you can own this unique replica of the awe-inspiring scene that turned the world skyward in *Close Encounters*... the magnificent Mothership hovering over Devil's Tower. Designed by The Ultimate Design Group, this 2½" x 4" x 2" (scale 1:75,000) metal sculpture has been two years in the making. A handsome conversation piece, the CE3K paperweight is perfect for use in your home, office, school... anywhere you want to express your belief in alien encounters.

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'Altered States'

(continued from page 31)

up to about 250,000 fleckles before we switch totally to a complete light image.

"Through computer animation we generate new fleckle mattes. Little scintillating chunks will be substituted for each computerized dot. We take our poor, well-worn original figure and put him back into our scene. We now have the person and the background. We have a series of weird mattes which will enable us to break up our hero from a normal body to a host of scintillating light particles. We then have a set of mattes which will allow us to take this new set of images and put it correctly back into our original, already-shot background. We have yet another set of mattes that will create the glows and changes in the background. Auxiliary mattes will, as the person glows, make the surrounding objects in the room brighter."

Ferren shrugs. "That's really all there is to it."

The totally astounding factor in all this hi-tech moviemaking rests in the fact that Ferren's entire process is done *after* the scene is shot. Using a computer army as a series of brushes and the frame as his canvas, FX artist Ferren and his team electronically touch up the scene in a manner almost imperceptible to the human eye. "It was nothing fancy," he underplays. "We had all sorts of computers, from dumb little microcomputers—you know, keep the lens in focus sort of things—to the 1170, which is a large model. We didn't use big-scale computer technology, just a lot of manageable smaller models. We used optical printers, computerized cameras and animation cameras—traditional elements."

Ferren breaks into a grin. "The thing that everyone should really know in advance about this movie is that you really do see *everything*. I try never to cheat. If you have something that's occurring, a person changing from one form to another, we don't do what most filmmakers do. You know, cut away as the person is approaching stage B, film a reaction shot and then return to the person in makeup. Filmmakers usually either do that or cover up everything with an explosion. Here's A. Poof! Here's B! We took the opposite approach, which is a fairly dangerous approach. Those transformation scenes are there in their entirety. When the script calls for a person to have all his skin stripped off during a cosmic explo-

sion and then be transformed into an incandescent figure, you see that happen. Any cutting away is done for dramatic effect. When we return to the figure, you pick up at the point you left off."

"Of course," he adds modestly, "we did come up with some clever little tricks every now and then. We worked human psychology, physiology and perception into some of our effects. We pulled little stunts that would trigger a response in the human brain to something that wasn't actually occurring. For instance, if we were producing a brilliant flash of light, we were limited by the fact that we were working with clear film. The film just can't get any brighter than it is when shown in the theater. So we pulled some tricks."

"Before a bright flash, the scene drops in intensity a little bit to give us a hedge. We produce the flash in one color and the scene drops again in brightness. Immediately after, it gives the same effect as you get when your iris closes after a bright flash in real life. We produced a ghost flash in a complimentary color to complete the effect. If we have a red flash on the screen, a blue ghost is seen fading afterwards. What all this does is give the brain a set of clues that are normally supplied by a real situation. We've tried to take advantage of perception and the human experience throughout this movie. In this particular case, we've managed to mentally provide a flash that seems brighter than anything we could have physically provided in a film situation."

"To give you an idea of how involved this was . . ." Ferren gets up from his desk and walks through the hallways. He stops before a wall filled with film cannisters: "These cans of film amount to about one sixth the amount of film that had to be generated to produce about two and a half minutes of screen time."

Ferren turns his attention to an area he is especially proud of: the physical effects created for the film. "In one scene, we needed to construct a time-and-space whirlpool. Instead of resorting to optics, we built a real whirlpool in a duplicate set. We built it out of inch and a quarter plexiglass so I could light it from below. It cost a lot of money for about 15 seconds of film time, but on the screen you see a real iridescent whirlpool. You are aware that it is real, not like the black hole effect in *The Black Hole*.

"The actors weren't too excited about working with 180,000 gallons of churning water being shot out of turbopumpers. It was scary stuff, but they were real-

Alternate Space

(continued from page 21)

L-5ers want increased government funding for SPS.

However, only one paper, the *Washington Star* (Aug. 27) carried our exposé. Newspaper readers from Boston to Denver were left believing Americans hate SPS, thanks to Ken Bossong.

I'm not telling you the saga of Bossong vs. Henson in order to cry on your shoulder. I want your help. The stakes are high. SPS construction would open up thousands of jobs in orbit. The technology developed for SPS will probably include lunar and asteroid mining, space farming and the founding of orbital cities. This is it, folks. The big time. SPS is our ticket to jobs, homes and prosperity in space.

But SPS won't have a chance to prove itself if the dirty tactics of Bossong's Coalition Against Solar Power Satellites go unopposed. So I'm putting a price on his head. I will write one Alternate Space column praising the heck out of the individual or organization that does the best job of (legally) neutralizing those guys, and send the hero the check FUTURE LIFE gives me for that column.

Please, don't tell me anything you wouldn't want the FBI to know. Remember, we're supposed to be the good guys! Now, all you bounty hunters, Ken Bossong can be reached at Citizens' Energy Project, 1110 6th St. NW #300, Washington, DC 20001. You can reach me at 1620 N. Park, Tucson, AZ 85719. If we work together, we'll get off this planet yet.

ly great about it."

Ferren returns to his office, stating that at the ripe old age of 27 he doesn't feel that he's accomplished all that much with his life as yet. "After all, this is only my first big movie," he says modestly. Surrounded by an entire floor of various film and electronic gadgetry, the man largely responsible for the altered images in *Altered States* reflects on his soon-to-be status in the motion picture industry. "I'd like to experiment more," he says, "do new things from scratch. I'm not really the kind of person to settle into a routine. I dropped out of high school. I dropped out of MIT."

He leans back into his chair, the creator of a whole new line of celluloid special effects, and chuckles. "I guess I just resist people's attempts to educate me."

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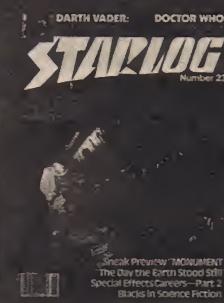
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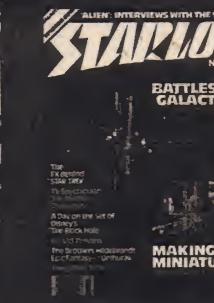
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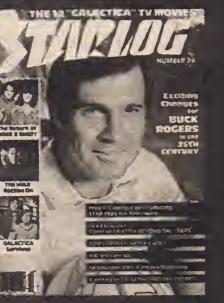
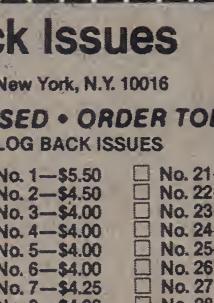
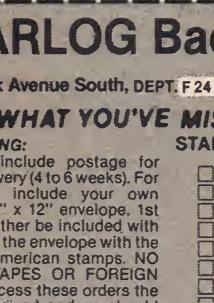
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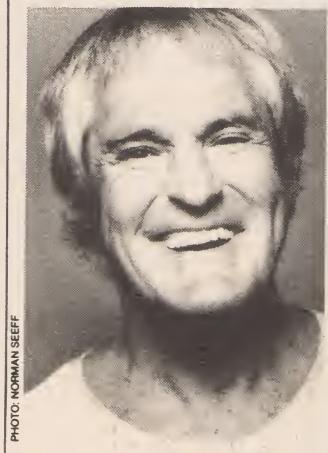


PHOTO: NORMAN SEEFF

Dr. Timothy Leary... think or say what you will about this 20th-century enigmatic character, but always include stimulating, brilliant, outrageous, controversial and any number of other adjectives. From his post as professor at Harvard in the '50s, Dr. Leary graduated to the Guru of Psychedelics in the '60s, ("Tune in, turn on, drop out!"), went the illegal-fugitive route in the '70s and today lists his occupation as Evolutionary Agent. His dictum for the 80s is S.M.I². L.E.—Space Migration, Intelligence Increase and Life Extension. Presently based in Los Angeles, Dr. Leary is busy writing an autobiography, and is author of several books and monographs including *What Does WoMan Want?* and *Jail Notes*.

Scientist Superstars

The intelligence of a society—indeed, the evolutionary level of a culture—can be easily diagnosed by examining its heroes. It is the mark of a barbarous, warlike culture that its heroes are military conquerors. It is the mark of a soviet, bureaucratic society that its heroes are mean-faced, unsmiling administrators.

It is the mark of an intelligent species that its heroes are exemplars of sagacity, wit, courage, skill in exploring; comprehending and collaborating with the forces of nature. Thus, we are all honored to be living now, when a New Superstar Breed of Scientist is rewriting human destiny.

Throughout human history those who successfully probed the wonders of the universe have been treated with an awed and flawed suspicion. Usually the Smart Ones have been labelled as wizards, magicians, aliens, kooks, often as agents of the devil. Why? Because they think for themselves. Scientists have never been pop figures. Typically they have been tolerated, protected, patronized by rulers who exploit their work. The average person has never understood how scientists operate. In the past this has not slowed down the advance of knowledge because kings and dictators paid the bills and no one cared what the peasants thought anyway, as long as they didn't think for themselves.

After the technological revolution, scientists were supported by large corporations or the military and were thus shielded from the marketplace of public opinion.

In the last two decades, however, the cultural situation in America has

changed. We have become USA-TV. We are governed by a media-ocracy, a television democracy of competing pressure groups representing every caste and class. The so-called minority groups have been most successful in dramatizing, legitimizing and enhancing their status. There is, of course, no majority, moral or otherwise, but a shifting mosaic of genetically-special constituencies competing for their share of the action. While compassionate concern for the socially or genetically disadvantaged is the righteous mark of a civilized race, it is species suicide to legislate equality at the expense of excellence, especially scientific endowment. Because the grim bottom line is this: Science and only science can solve the problems of the past and fabricate the improved future.

It is not the military, nor the politicians, nor the religious leaders, nor the public-opinion makers upon whom our survival and evolution depends. It is the New Scientists. Since we live in a media world, the image of science is suddenly a matter of great evolutionary significance. For the first time scientists are able, indeed, are forced to tap-dance in front of the omniscient electronic eye and compete with other minorities for financial and public support.

The situation is rather thrilling. Scientists, like professional athletes, belong to a special caste. Their brains are wired differently. They employ special rituals, languages, modes of thought. They inhabit special realities. Scientists, like it or not, belong to an almost monastic elite which operates in the future tense. Traditionally they are viewed with a wary respect because they are very intelligent. In

the past they have kept a low profile, avoiding publicity and communicating in a language which prudishly avoids the hype of religion and the deceptive vanity of politics. Their jargon underplays, deliberately conceals the far-out, mind-blowing splendor of their subject matter. They are forced to downplay their achievements because their discoveries inevitably imply changes in orthodox ways of looking at things. Copernicus, without the help of the publicity department, kept his heliocentric discoveries secret from the Vatican thought police for 18 years.

The "bad image" of scientists is no accident. It represents pro-phobia; fear of the future; eery, scary distrust of the mysteries to come. We confront here the Dread Frankenstein Complex which has probably encouraged more stupidity than any myth since Christ the Suffering Redeemer of our (sic) sins. Frankenstein was introduced in 1818 by Mary Wollstonecraft Shelley. This "novel of terror" presented a young, idealistic, clean-cut, heroic student who learns the secret of infusing life into inanimate matter and creates a monster that ultimately destroys him. There! That will teach a lesson to those who want to think and create new forms!

The Frankenstein legend is a replay of the ancient Prometheus myth. Prometheus was a recombinant DNA researcher who created humanity out of mud and water. When Zeus, the local soviet commissar, enslaved humanity, it was Prometheus who stole fire and gave it to our species. He taught many useful arts and sciences. Remember how that jealous, malicious, revengeful Judeo-Christian Jehovah wiped out humanity with a disastrous flood? Well, Prometheus saved our species from the same flood. In reward for these services he was chained in solitary confinement and tortured regularly. The chemist Lavoisier was beheaded by French reformers. Atomic scientist Oppenheimer was tried and disgraced in the McCarthy era of the 1950s. At this moment, Russian physicist Andrei Sakharov is exiled in Siberia for independent thinking.

The corporate bureaucrats who now manage our myths from Hollywood have continued this derogation of the independent scientist to our extreme disadvantage. In *The Boys from Brazil* a genius biologist develops human cloning



Cruse

techniques. He produces, not 100 Bo Dereks or Einsteins, but 100 little Hitlers! Other brilliant, bold, creative fellows who fabricate cities underwater, in Alpine retreats, in outer space, and who cleverly foil the combined plots of the Soviet-American militaries, are always destroyed by a macho CIA-KGB wretch named James Bond.

This calculated distrust of scientists is a relic from earlier stages of evolution when popes and generals were in charge and scientists were unreliable employees; untrustworthy because their loyalty to their craft, to their own minds, was greater than to the local Zeus. The Smart Ones always make religious people nervous because their discoveries challenge the authority of dogma, particularly the Bronze Age profundities of the Bible. Every new discovery violates common sense. "My God, now these devils are claiming that this solid, flat Earth is a spinning sphere orbiting around the sun!"

The worst thing about the Smart One Caste is that they are arrogantly individualistic. They trust their own data and the integrity of their own minds. In truth, scientists are not just heretics; they are aliens, futants, foreastes, early representatives of later, more advanced stages of evolution in which the individual is expected to make up his or her own mind. We are all going to grow up to be scientists if we are going to evolve.

Have you noticed how the image of scientists is suddenly changing? Let us call this the Carl Sagan phenomenon. Good looking physicists on the Carson show. Sexy Gerard O'Neill talking to Merv. The image of the retiring, square, fuddy-duddy scientist that we grew up with is, happily, over.

During the industrial revolution scientists were domesticated, co-opted, bribed by the industrialists. In return they produced neat-tidy protestant-ethic philosophic models which supported a practical, Calvinist deity whose clock-work universe was slowly, but comfortably winding down. The Newtonian cosmos operated on the pessimistic principle of entropy. Dutiful, dour Darwin, once the giddy, fast-moving optimism of Lamarck was anathematized, claimed that changes evolve very slowly over millions of years. Engineering could and would ease the pain of day-to-day living, but the classic science scenario of yesterday had us trapped on an insignificant,

boondock planet itself doomed to heat-death. There was no escape from aging and death. Nature was enemy; wog to be colonized. Our survival strategies were defensive. The ultimate helplessness of 19th century science did nothing to disturb the bleak, monolithic pessimism of the Judeo-Christian horror show. Examine one of those famous black-and-white photos of gloomy scientists taken at their meetings in Copenhagen or Vienna or Berlin and you will be reminded

of a banker's convention or an undertaker's reunion.

But all that is changing! Science has become Americanized; i.e. optimistic, expansive, self-confident. Scientists are mutating like everyone else in this country. How? In the direction of self-directed, self-responsible narcissism.

In the last two decades every American institution has suffered a severe loss in public confidence. Seems that almost everyone is getting sophisticated enough to question authority. My God, everyone is suddenly thinking for themselves! The officials are outraged, of course, denouncing the Me-Generation. But it's nothing new. It's just the old Red-White-and-Blue rugged frontier individualism of Carnegie, Burbank and Edison now joyfully accepted by the person in the street. If the big guys can get away with it, impose their will, their personal reality, then why can't we? Remember when Henry Ford II was arrested in California for drunken-driving with a luscious model (not his wife) in the car? Next week he told an audience of cheering auto executives and Republican leaders that his motto was "Never complain, never explain." Well right on Hank! Suddenly everyone is catching on; everyone is proud of their special singularities. Black pride. Gay heroes. Latin American pride. Women's liberation. Even those former models of docility, professional athletes, are getting business agents and becoming free agents. Everyone seems to be coming out of the closets of conformity, declaring themselves free agents and taking responsibility for their lives.

This explosion of giddy, proud individuality in the last two decades is encouraging everyone to proclaim, validate and busily maintain their own ideoyncratic view of reality. Cosmic self-confidence is in the air. Otherwise normal people are running around claiming to be sent from Atlantis or Sirius to save our planet. Fundamentalist Christians by the thousands announce an impending Armageddon which only Southern Baptists will survive. Whoopee!

In this wonderful, kooky transition period when all the old religions are collapsing and arrogant heresies are flourishing, suddenly, that most powerful minority, The Smart Ones, the readers of this magazine, the scientists, are coming out of the closet declaring themselves free agents and publishing their new

"It is not the military,
nor the politicians, nor
the religious leaders,
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This is a momentous moment in the history of humanity because the scientific method works. Innovating intelligence is the ultimate tool. When it was hunter-gatherer time the scientists found the flint and chipped the knives. When it was agriculture time the Smart Ones selected the seed and dug the irrigation canals. When it was World War Empire time the physicists produced radar, rockets and nukes.

Now as we move into the Age of Information we see that intelligence, not human-power, not fire-power, but brain power is the key to survival. The day of the Scientist-Hero has dawned! The Season of Prometheus. It's time for the neolithic athlete and the barbarous general and the Metternich politician to step aside and for new heroes to emerge. It is simply an intelligent use of intelligence for scientists to use their skills to glamorize and empower their own caste. Scientists of the World Unite! You have nothing to use but your brains!

Let's put it bluntly: Scientists should stop shirking their responsibility and take charge of human affairs. When we were territorial primates we were naturally led by barnyard politicians. We now understand that spaceship Earth is a delicate, complex web of energy processes that must be understood and harmonized if we are to evolve. Politics has become too important to be left to partisan politicians who cannot understand the changing reality. Our rulers in the future must be people with scientific training and with brains wired to handle relativistic complexity. We would not let the controls of a 747 fall into the hands of a congressman. Human societies have become much more complicated mechanisms than jet planes.

Scientists must be encouraged to emerge from their suburban splitlevels and accept the decision-making responsibility. In their hearts most Americans know this to be true. The current disillusion with politics, the abject decline of the presidency, reflects the deep, instinctual hunger that we all feel for intelligent, non-partisan excellence in our leaders.

Scientific societies should organize the way movie studios or publishing houses do. They should hire public relations experts, advertising consultants,



"Now, as we move into the Age of Information, we see that intelligence, not human-power, not fire-power, but brain-power is the key to survival. The day of the Scientist-Hero has arrived!"

marketing wizards. What we are marketing, after all, is the most wonderful product—fair-minded, future-oriented intelligence.

For starters, let's have the Nobel Prize Awards be televised with the suspense and hype of the silly Oscar ceremonies. How about Elizabeth Taylor and John Travolta holding the envelope containing the name of the winner for physics? Flood the land with bumper stickers announcing: INTELLIGENCE IS THE UL-

TIMATE APHRODISIAC. Let our activists picket and boycott all movies which glorify stupidity. Violence and sex are minor issues; successful ignorance is what our children should not be exposed to.

Let's have humanizing gossip about our genius researchers. Erotize the scientists and scientize the eroticists! Discovery is fun. Let's make the competition for knowledge a spectator sport. Let's have Howard Cosell breathlessly describe the great MIT vs. Cal Tech contest for first human clone. Let's have *People* magazine run cover stories on Jean Dausset, legendary French immunologist, resistance hero, fabled Parisian *bon vivant* and recent winner of the Big Game at Stockholm.

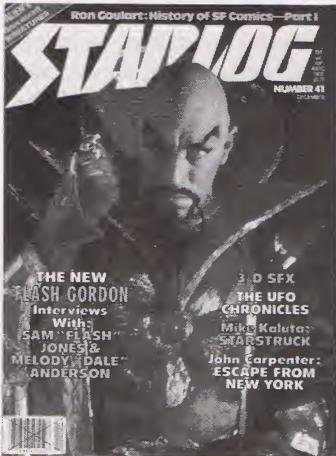
Science is the most exciting, vital, fast-moving game on the planet. Let's not hoard the thrills.

Soon I hope to nominate for adulation, acclaim, super-stardom some of the Super-Bowl scientists who are currently breaking all records for destiny-changing discovery. We shall cover the San Diego semliki forest virus cloning scandal. Did Ian Kennedy cover up his every skill or did jealous colleagues sabotage his petri dishes? We shall cheer Ilya Prigogine's courage in liberating us from the punitive, oppressive, unconstitutional Second Law of Thermodynamics! Gerard O'Neill shocks NASA with his precise Space Colony blueprints! Can Christianity survive the indeterminist, relativistic findings of Quantum Physics? The heartwarming love between John Lovelock and Lyn Margulis which produced the Gaia theory! Roy Walford of U.C.L.A. announces that inoculations against aging and death may come in the next two decades! Who is behind the physically violent attacks on Arthur Jensen and Hans J. Eysenck for studying the inheritance of intelligence? Why did militant feminists throw a pitcher of water on the head of Professor Edward Wilson of Harvard during his Sociobiology lecture? Is it the KGB or the CIA or the Tri-lateral Commission that has sabotaged our space program in favor of the Russians? Why has the U.S. government blocked all research on brain-change, intelligence-increase drugs?

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THE GRAYING OF EARTH

Like it or not, we are all growing old. There is nothing, so far, that we can do about it. Humans continue to probe the subject of immortality through various methods, but before the arrival of agelessness, we still have the realities of aging and death to deal with. Author Ned Madden examines the topic, looking into the aging process itself and the ways science is trying to reverse it.



ROGER ZELAZNY INTERVIEW

The name Roger Zelazny is synonymous with excellence in the realm of science fiction literature. The recipient of several Hugos and Nebulas, Zelazny has written 85 short stories and 20 novels, including his famed "Amber" series, now being considered as a movie project. From his home in Santa Fe, the author answers questions concerning his use of religion and mythology in his writings, his ideas about personal freedom and the difference between writing short stories and novels.



ALTERED STATES

Ken Russell has done it again—he's made another controversial movie, *Altered States*. As with most of his other works (including *Women in Love*, *Tommy*) lots of people love it, and lots of people hate it. This time Russell ventures into the worlds of isolation tanks, psychedelic time-trips and the universal quest for the meaning of life. In addition to Ed Naha's up-close inspection of the film, **FUTURE LIFE** will delve into the real-life isolation tank work of Dr. John Lilly, as well as a first-hand account of what it's like to be in a tank.

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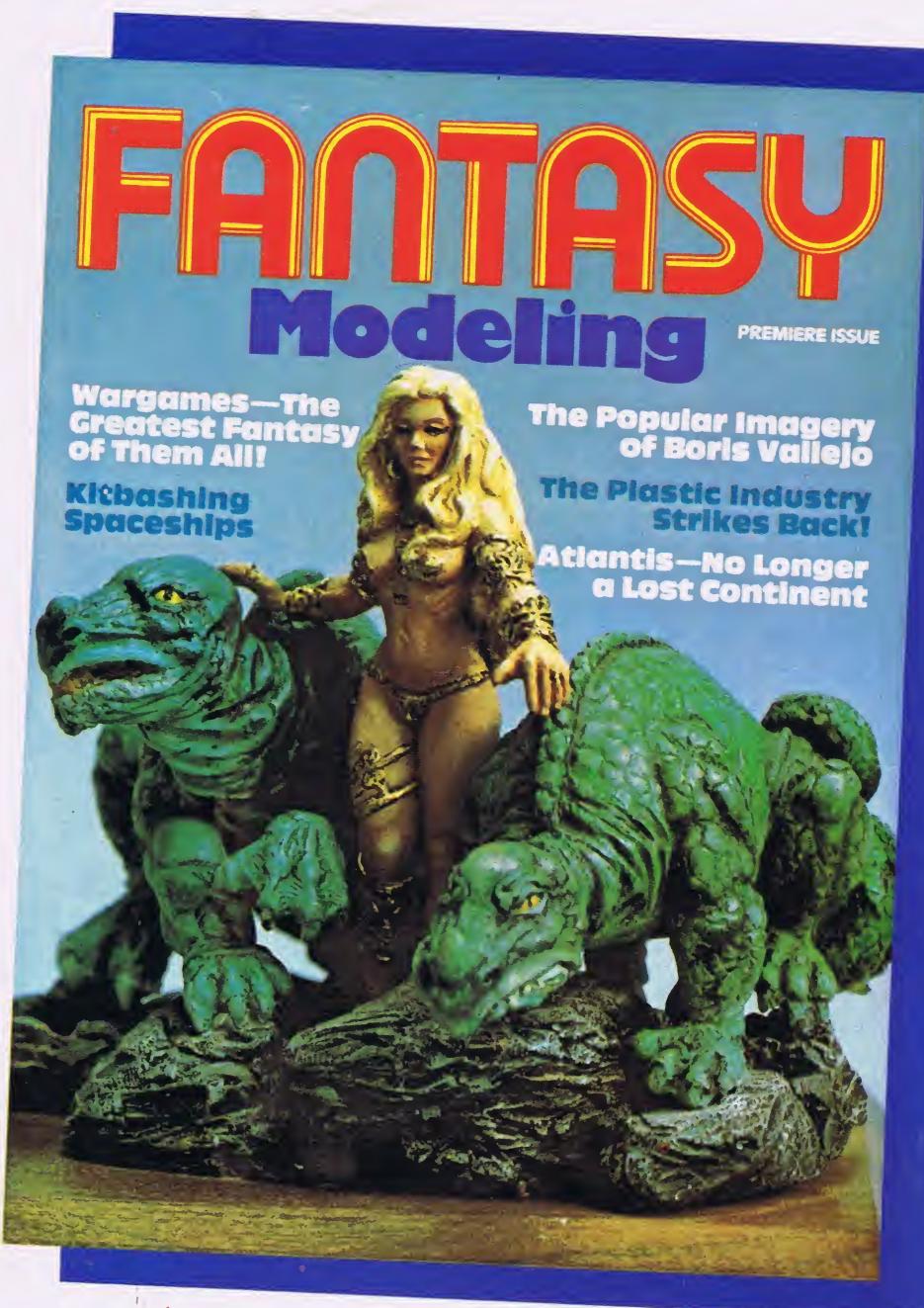
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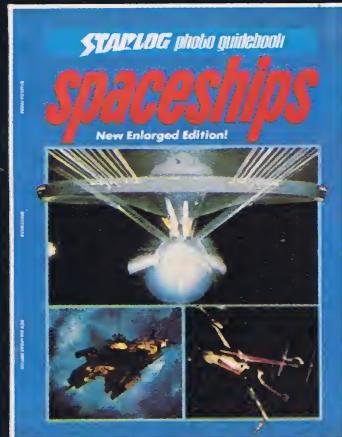
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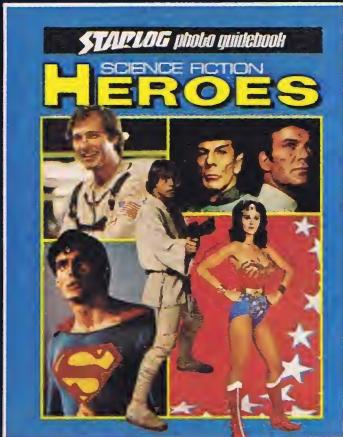
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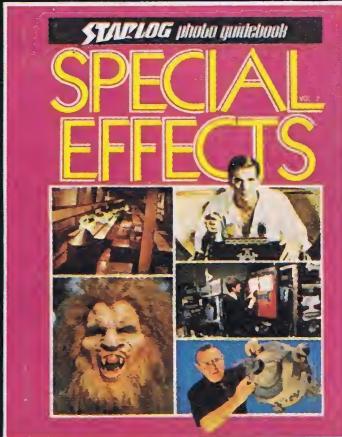
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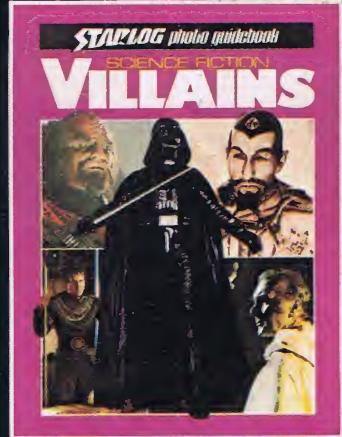
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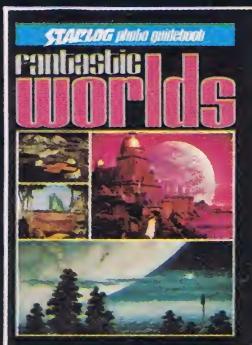


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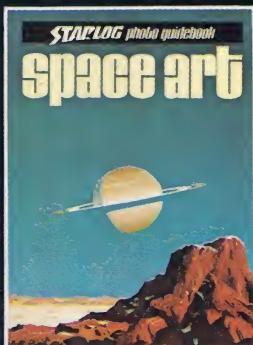
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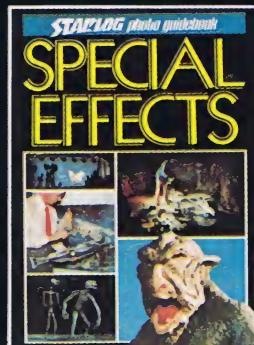
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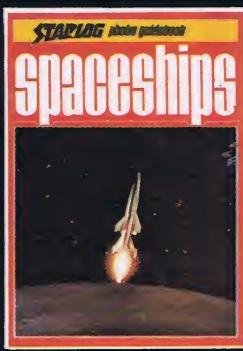
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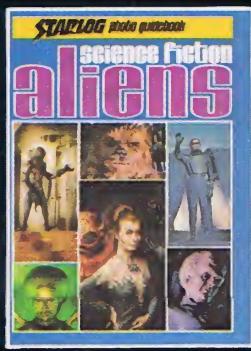
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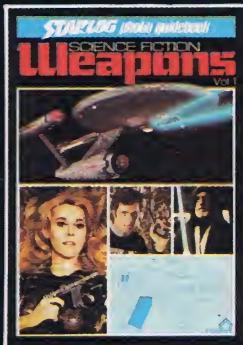
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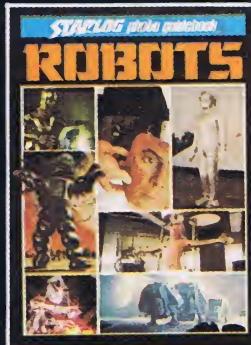
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